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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

COUNTRY Rumania/Poland/Czechoslovakia

DATE DISTR. 27 DEC 1950

SUBJECT List of Subscribers to Blast Furnace and Steel Plant

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- end -

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Steel Plant Engineering and Maintenance

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Member of A.B.C.

Pittsburgh, Pa.

Member of A.B.P.

Vol. 38 SEPTEMBER, 1950 No. 9

THIS MAN IS DELIVERING A *Steel Plant*

He's a McKee Company Engineer, and along with the plans he carries, he delivers the specialized services and 45 years' experience of the McKee organization. Symbolized behind him are the technical experts and skilled personnel necessary for the construction of a single blast furnace or steel plant.

During the past year the McKee organization had in process of completion, simultaneously, 35 petroleum refinery and iron and steel plant projects in the United States and 10 foreign countries.

Arthur G. McKee & Company has the men, the experience and the resources to undertake iron and steel plant and petroleum refinery projects of any size in any location.

NATIONAL CONSTRUCTORS ASSOCIATION — OIL STEEL CHEMICAL

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DESIGN, ENGINEERING AND CONSTRUCTION FOR THE IRON AND STEEL AND PETROLEUM REFINING INDUSTRIES

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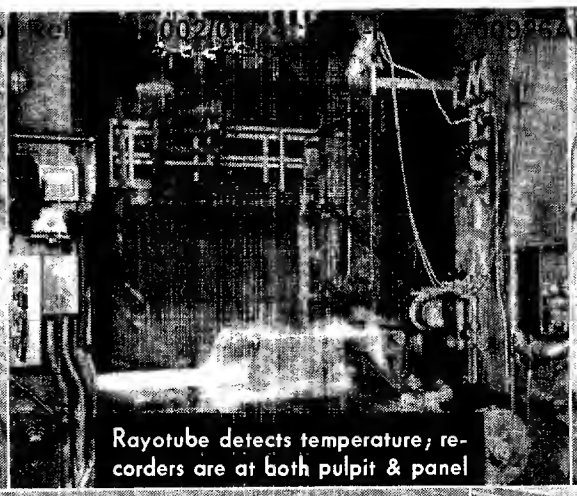
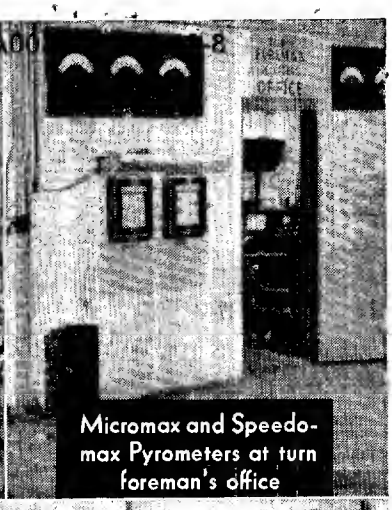
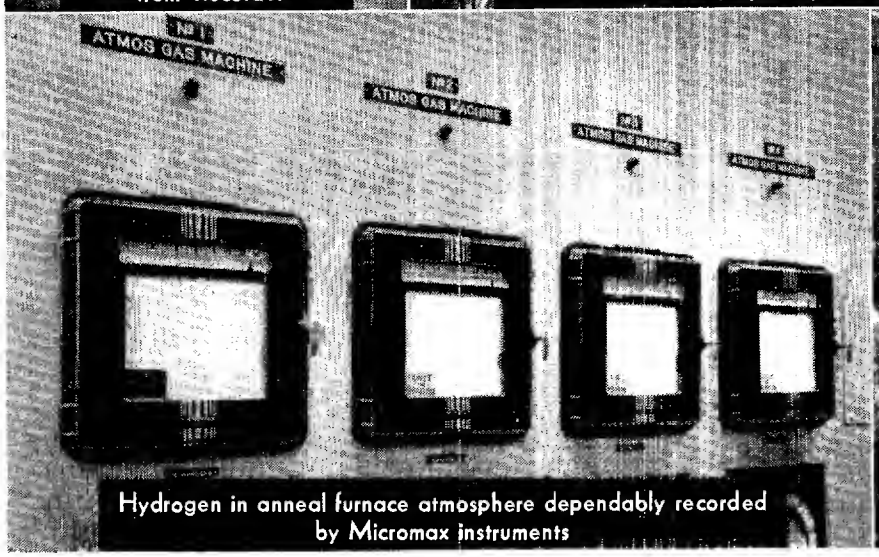
Hot Blast Control Unit located at valves remote from Recorder



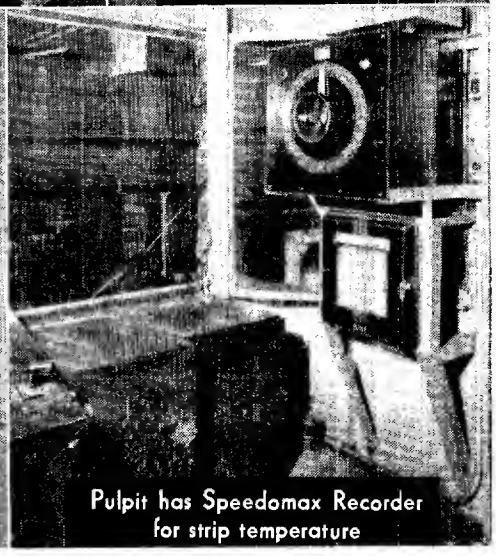
Rayotube detects temperature; recorders are at both pulpit & panel



Micromax and Speedomax Pyrometers at turn foreman's office



Hydrogen in anneal furnace atmosphere dependably recorded by Micromax instruments



Pulpit has Speedomax Recorder for strip temperature

FROM ORE, TO STRIP, TO ANNEAL
L&N HELPS INCREASE STEEL PRODUCTION

"Production and more production is our need. How can instruments help increase our output?"

Steel mill engineers who are asking that question of course already use hundreds of instruments to help production. A very few of these applications, old and new, are shown above.

One of the newer developments is *multiple* recording of temperatures of sheet, strip, etc. A *single* Rayotube detects the temperature of the moving steel it is connected to *two* Speedomax Recorders—one in the pulpit, the other at the instrument panel. Thus both the roller and the turn foreman are equally and simultaneously informed of this production-influencing temperature.

Another recent innovation uses Micromax Recorders to show the percent hydrogen in the manufactured protective atmospheres of annealing cover furnaces. These recorders help substantially to anneal at maximum speed.

Complete, integrated Temperature-Pressure-Combustion Control for all the larger furnaces minimizes or prevents time-wasting temperature swings, gives control of scaling, and enables any scheduled changes in temperature to be made in minimum time. By assuring correctness in both temperature and furnace atmosphere, it speeds production.

All L&N equipment ranks high in what some mill men call "percent availibility". It stays in service, dependable; all the way from blast furnace to finishing mills. We will be glad to give details—either by catalog or in person, as you prefer. Write Leeds & Northrup Co., 1971 Stenton Ave., Philadelphia 44, Pa.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

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● Every roll produced at National is "tailored to fit" exactly each individual requirement. Strength, hardness, chill depth, heat treatment are carefully controlled to produce rolls that will give long tonnage life under specific operating conditions.

Call upon our metallurgical staff to help you iron out your roll problems. Their technical knowledge combined with our manufacturing experience is your assurance of the right rolls that are "right" on the job.

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THE NATIONAL ROLL & FOUNDRY CO.

AVONMORE, PENNSYLVANIA

SPECIALISTS IN IRON AND ALLOY IRON ROLLS AND CASTINGS

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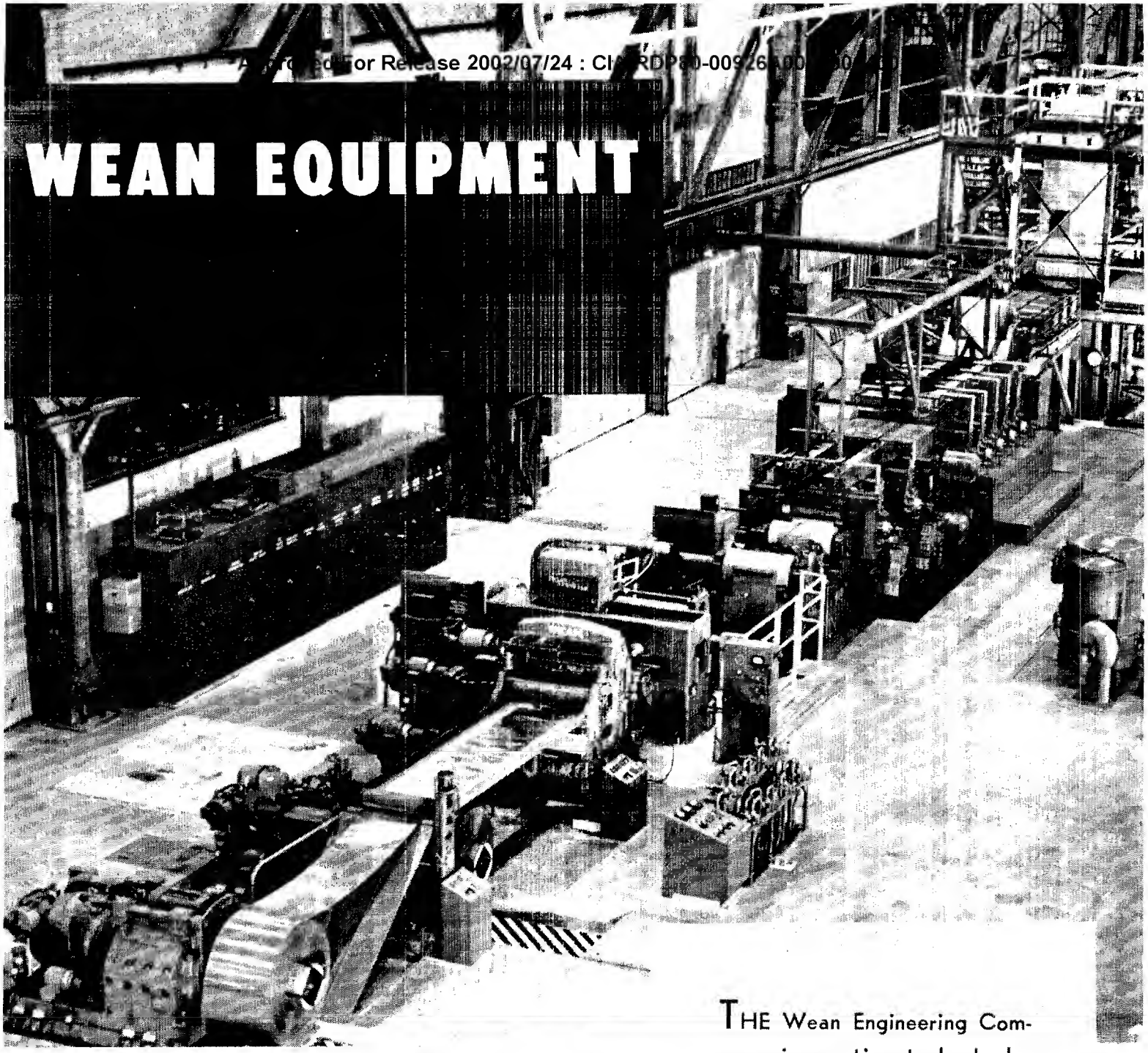

THE Wean Engineering Company is meeting today's demands for equipment to produce tin plate and zinc coated strip steel with light coatings by the electrolytic method; also equipment to produce chemically treated black plate and strip steel. Equipment for coating strip steel with zinc and other materials by the hot dip method is also available.

The WEAN

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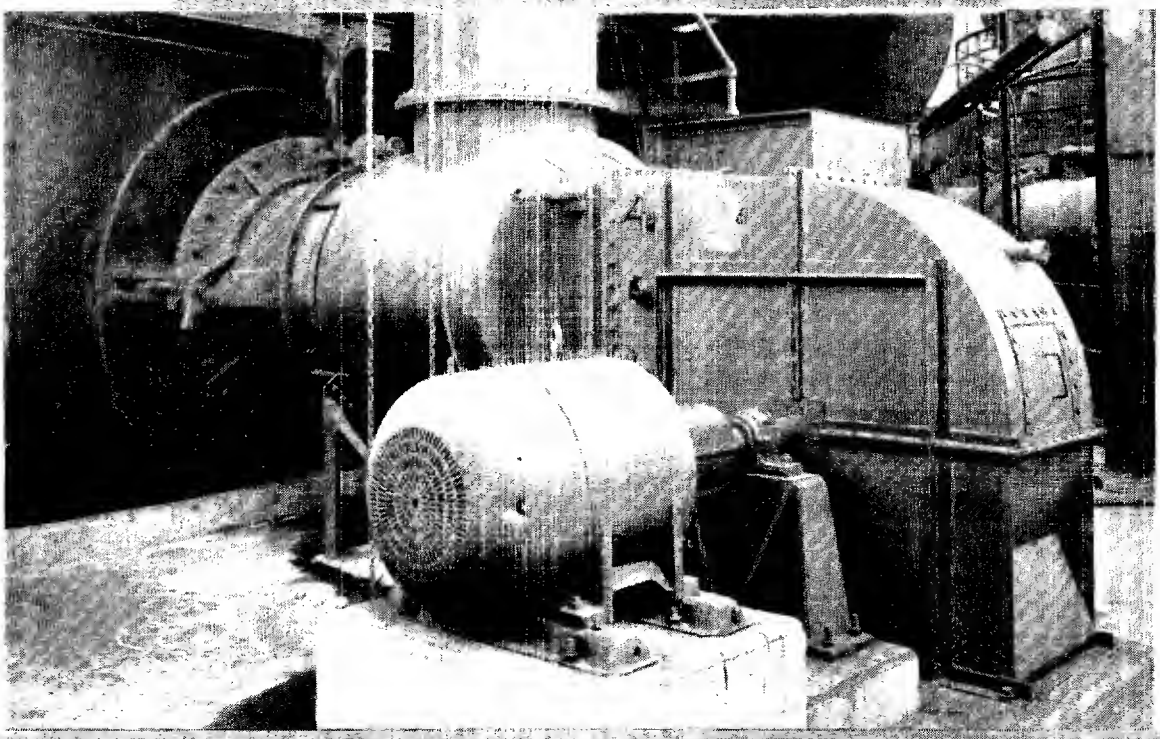
SPECIALISTS IN SHEET, TIN AND STRIP MILL EQUIPMENT

FREYN DESIGN

Blast Furnace Stove PRESSURE BURNERS

A RECENT REPEAT ORDER FOR 15 BURNERS ATTESTS THEIR SATISFACTORY PERFORMANCE



Installed in a new plant in the Chicago district

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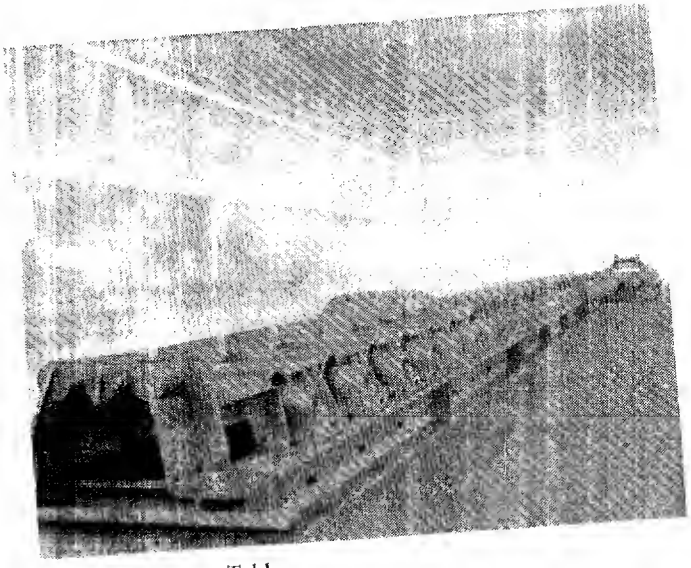
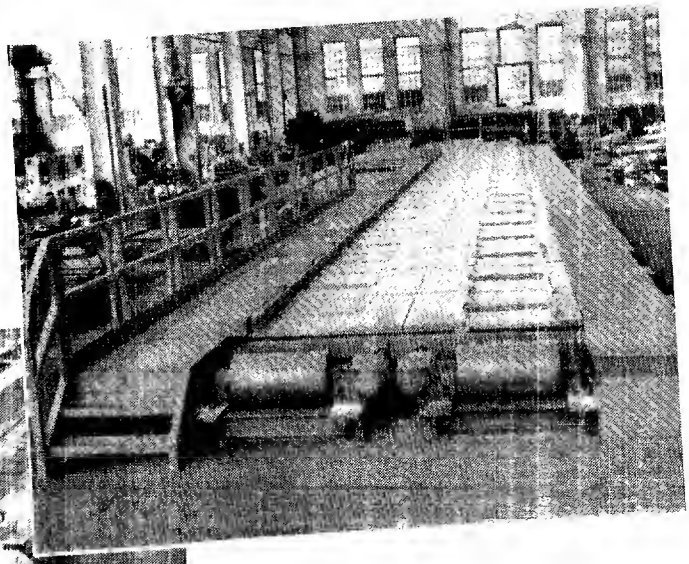


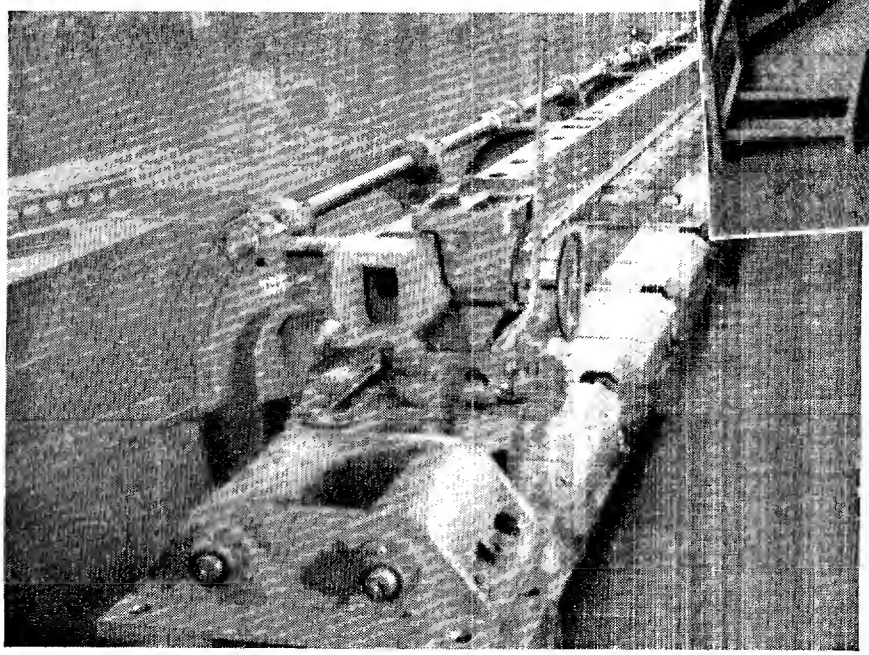
Furnace Charging Table

Birdsboro Engineering

at home and in the field is responsible for the *design, construction* and *installation* of rugged, dependable steel mill machinery which is helping industry of the world produce durable goods faster — and more economically.



14" Mill Table



Shear Gauge Table

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STEEL MILL MACHINERY

Designers and Builders of:

Steel Mill Machinery • Crushing Machinery • Rolls
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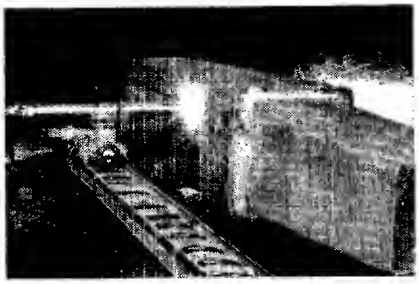
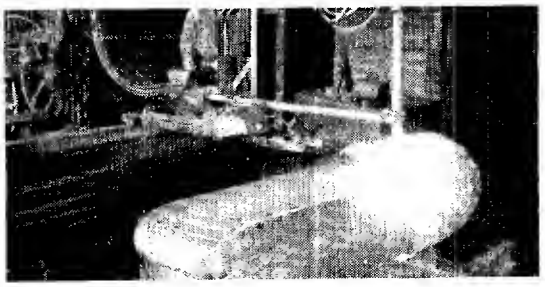
AIM 49-50

At the blast furnaces and open hearths, oxygen plays an important part. Even oxygen-lancing with the oxygen lance—one of the latest uses of oxygen cutting in steel plants—still saves time and reduces hazards.

Help on the Hot and Heavy Jobs



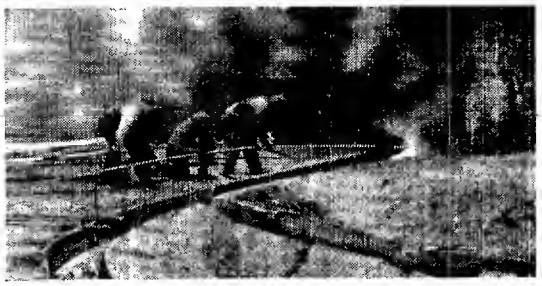
Ingots requiring 200 hours for mechanical "parting" have been split with the OXWELD C-45 heavy-duty blowpipe and then machined in 11 hours total time.



Cutting the hot top off this 20-inch forged slab with the C-45 blowpipe took less than 10 minutes and left the slab end square and undeformed.

The descaling blowpipe, equipped with the OXWELD starting-rod feed, has reduced conditioning costs more than 50 per cent.

Draining furnace salamanders by oxygen-lance tapping has reduced furnace down-time more than three weeks in some steel plants.



LINDE service engineers who co-operate closely with the steel industry—have combined experience, knowledge, and practical "know-how" to help make better steel, faster, and at lower cost

LINDE engineering service is always available to LINDE customers through the nearest LINDE office.

The words "Linde" and "Oxweld" are registered trade-marks of Units of Union Carbide and Carbon Corporation.

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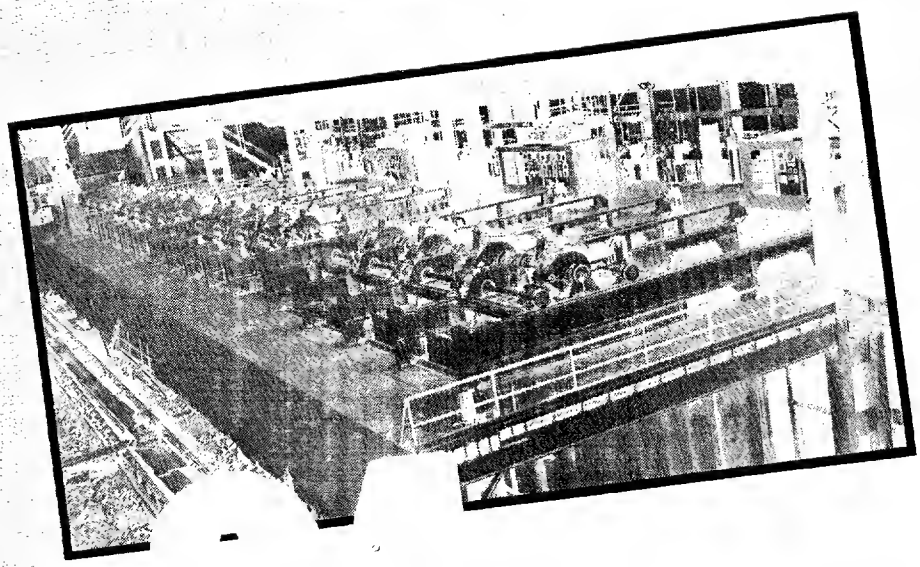

*

YEARS

OF DEVELOPMENT, ENGINEERING,
INSTALLING AND OPERATING

ONE-WAY FIRED PITS

SURFACE COMBUSTION CORPORATION

'Surface' SERVES THE STEEL INDUSTRY

INTERESTING ... DEVELOP...

'Surface' ONE-WAY FIRED

1926 The first "one-way fired" pits and the Stein recuperator.

1930 Chapman-Stein joins Surface Combustion in offering the "one-way fired" pit as "The Modern Soaking Pit".

1932 'Surface' introduces the baffle wall and slag pocket.

1935 'Surface' separates the recuperator from the pit structure.

1936 'Surface' builds the enlarged "one-way fired" soaking pit to make most effective use of control equipment.

1948 'Surface' applies the jet pump recuperative system for improved combustion efficiency.

1950 For the latest developments in "one-way fired" soaking pits, ask your 'Surface' Engineer.

● The "one-way fired" principle was modern 24 years ago, and the "one-way fired" soaking pit is the modern pit of today.

Basically, 'Surface' One-Way Fired Soaking Pits remain outstanding in their simplicity of construction and continue to produce with correspondingly low operating and maintenance expense.

SURFACE COMBUSTION CORPORATION • TOLEDO 1, OHIO

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STEIN & ATKINSON, LTD.—LONDON
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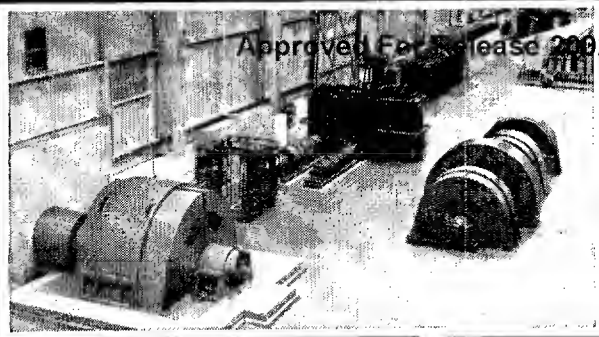
WILL L. SMITH, S.A.—BUENOS AIRES

One-Way Fired Soaking Pits
Billet Reheating Furnaces
Slab Heating Furnaces
Continuous Type, Controlled Atmosphere Strip Annealing and Normalizing Furnaces
Controlled Atmosphere Annealing Covers for Wire and Rod
Controlled Atmosphere Annealing Covers for Coil and Sheets
Continuous Furnaces for Heat Treatment of Steel Plate
Controlled Atmosphere Furnaces for Carbon Correction in High Alloy Rod and Bar Stock
Continuous Type Bright Annealing and Normalizing Furnaces
Prepared Gas Atmospheres Generating Equipment
Pit Type Convection Furnaces for Rod Annealing
Stress Relief Furnaces
Wire Patenting Furnaces

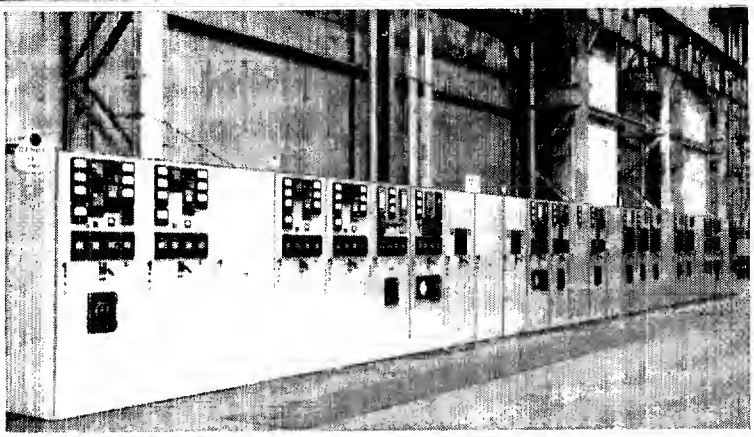


...,500 volt switch-gear, power goes to the 4000 kw, 3 machine flywheel M-G set driving the 5000 hp reversing bar mill motor. M-G set, *Regulex* control, exciter set (behind motor), and motor all Allis-Chalmers.

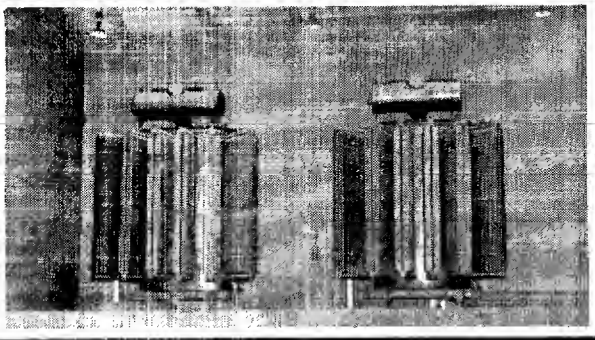
INCOMING 13,800 V

3 ϕ 60 ~ LINE

Allis-Chalmers switchgear controls all 13,800 volt incoming power. Exclusive metal clad switchgear with drawout, vertical lift air blast circuit breakers are used here for distribution and for controlling motor starting and dynamic braking. The starting reactors are in the basement under the switchgear.

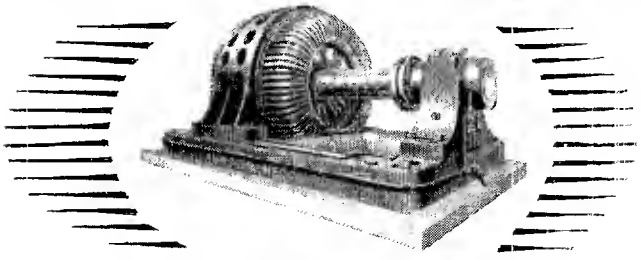


This outside bay of two Allis-Chalmers rectifier transformers steps voltage down for the 1500 kw mercury arc rectifiers providing 250 volt d-c mill supply. Transformers connected to rectifiers inside building by metal clad ducts through wall.



These two factory packaged heavy duty 1500 kw *Excitron* rectifiers provide 250-volt d-c mill supply. Heat exchangers built on rectifier frame. Anode breakers and transformers are at left, 250 volt d-c switchgear out of camera range at right.

Allis-Chalmers Guides



For 25 years Allis-Chalmers 800 and 1000 hp (shown above) synchronous motors have been in operation on the Lorain No. 1 seamless tube mill. These were the first synchronous rolling mill drives used by the U.S. Steel Corporation.

THIS PHOTO-SCHEMATIC shows the flow of power operating the entirely new Blooming, Bar and Billet mill at the Lorain plant of the National Tube company.

Feeders from the 13,800 volt switchgear go to the motor-generator sets for the separate mills, to the *Excitron* rectifiers providing d-c mill supply, and to transformers and switchgear providing general purpose 2300 and 480 volt a-c auxiliary power. *Regulex* control of the exciter

ALLIS-

Power, Electric,

Continuous billet rolling is begun in this 6 stand, close-coupled mill. Power at 13,800 volts is converted in the 5 machine, 8000 kw synchronous M-G set seen here. Six d-c motors of 1750 hp each, *Regulex* controlled, drive the mill.

An Allis-Chalmers [illegible] kw, synchronous M-G set (shown preceding photo) converts the power to drive the four stand continuous billet mill. Speed of the four 1250 hp motors is regulated by *Regulex* variable voltage control.

G M G

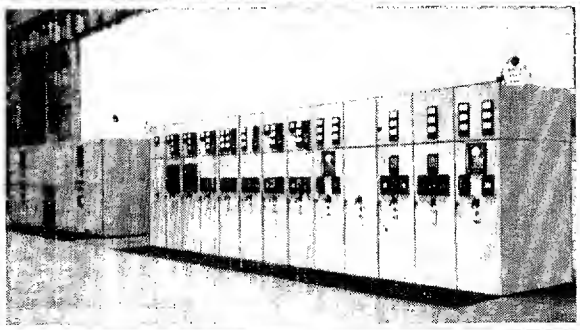
SEE THE A-C EXHIBIT AT THE AISE CONVENTION

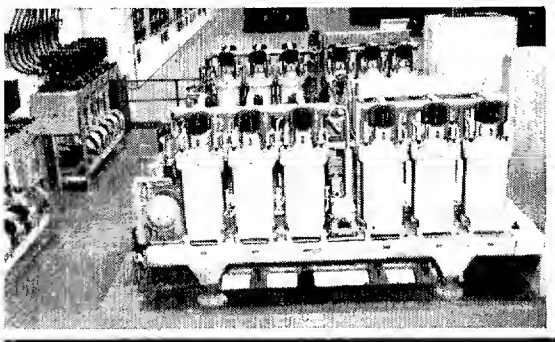
CUTAWAY & WORKING MODELS

- Tube-Cooled and General Purpose Motors
- Liquid Rheostat
- Air Break Contactor
- CW Solids Pump
- D-C Positioning Device

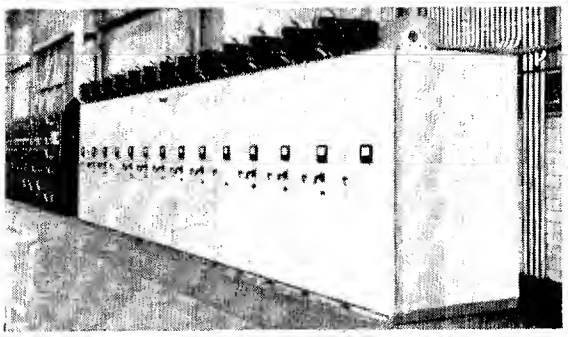
BOOTHS 35, 36, 37
EXHIBIT HALL
CLEVELAND PUBLIC AUDITORIUM

General purpose a-c power is supplied through four Allis-Chalmers transformers totalling 10,000 kva (shown schematically). These are connected to 2300 volt metal clad (right front) and 480 volt metal enclosed (left) switchgear.





Direct current at 250 volts is distributed to mill supply through this Allis-Chalmers switchgear. Feeder breakers protecting d-c system and cathode breakers located here. Purchased and by-product power systems meet in d-c mill supply bus.



Power in Lorain Mill

sets (also A-C but not shown) enables each of the continuous billet mills to operate close-coupled.

The National Tube company has bought a wide range of associated apparatus from Allis-Chalmers and has gained undivided responsibility for the operation of this equipment. National Tube already knew from experience that A-C equipment is reliable; 12 Allis-Chalmers motors in No. 1, 2 and 3 Seamless mills, ranging from 600 to 3500 hp, are now approaching a quarter century of service.

A qualified steel mill representative will give personal attention to the electrical requirements of *your* plant modernization or expansion. A-C builds a complete range of generation, switching, conversion, rectification, drive, and control equipment. Offices in all major cities.

ALLIS-CHALMERS, 1029A SO. 70 ST.
MILWAUKEE, WIS.

Regulex and *Excitron* are Allis-Chalmers trademarks.

CHALMERS

A-C ALLIS CHALMERS

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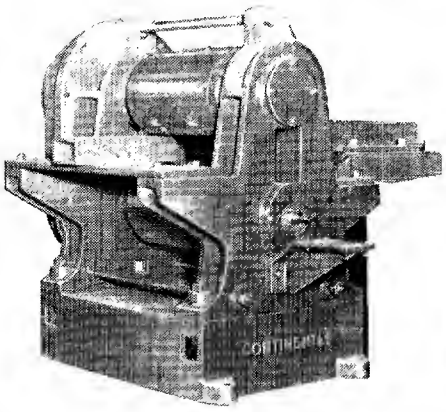
Processing Equipment for Iron and Steel

Continental
AUXILIARY
MILL EQUIPMENT



Cropping and Dividing Shear

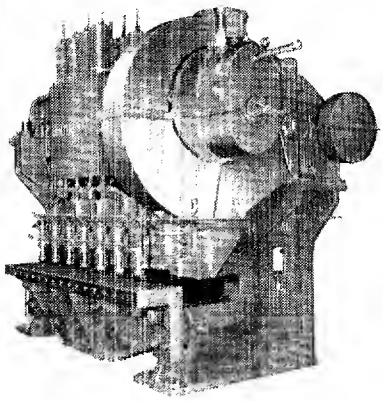
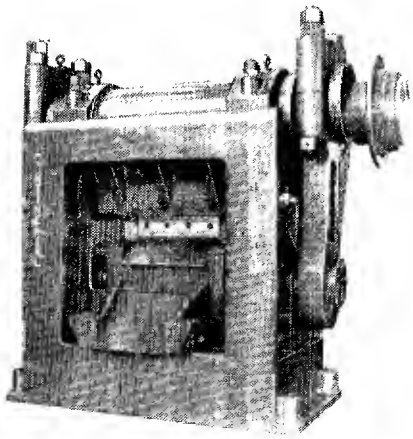


Plate Shear



Upcut Bloom Shear

PRODUCERS OF: Complete Rolling Mill Installations including:

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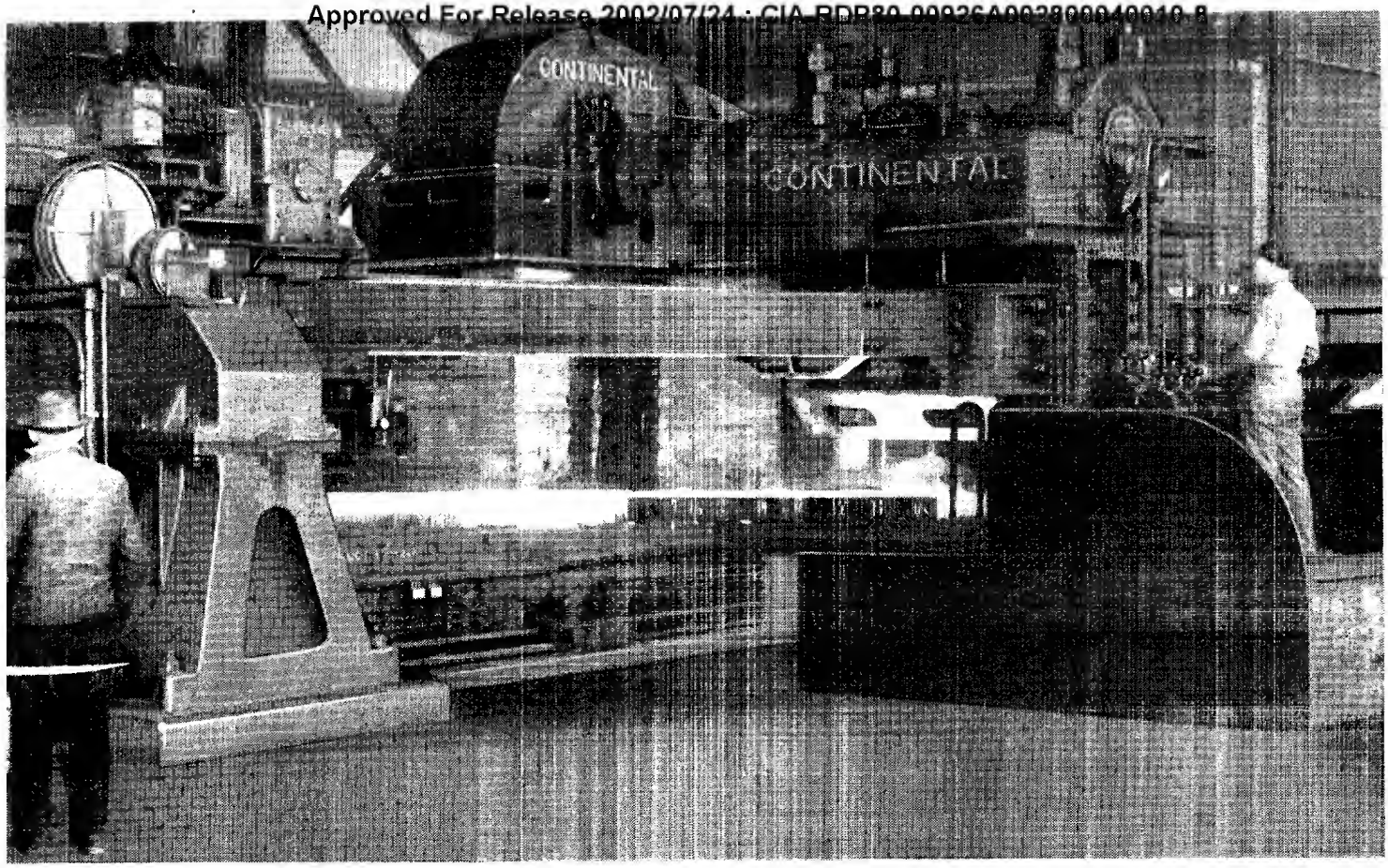
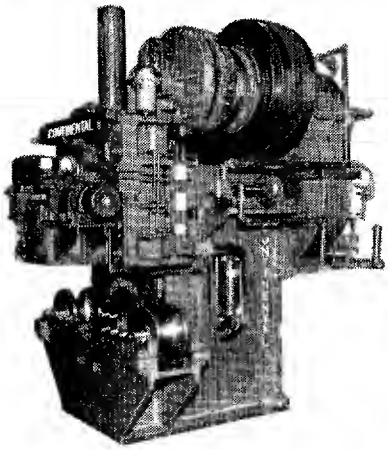
- Tables
- Transfers
- Sheors and other auxiliory steel plant equipment

IRON, ALLOY IRON ond STEEL ROLLS for ferrous ond non-ferrous rolling mills; pulp ond paper industry; textile industry; ond milling, cereol ond vegetable oil industries.

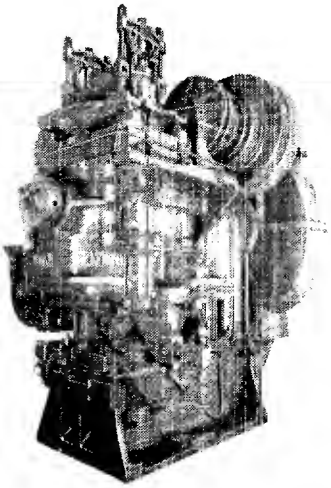
CARBON ond ALLOY STEEL CASTINGS from 20 to 250,000 pounds. Complete heot treating and machining facilities.



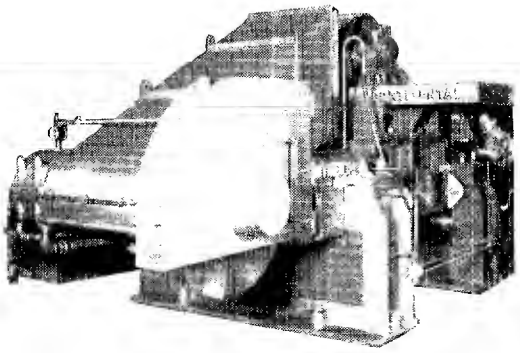
Downcut Slab Shear and Gauge



Straightening Press

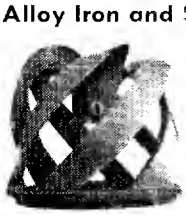


Tie Plate and Splice Bar Punch and Shear



Heavy Duty Hot and Cold Saw

ROLLS
Iron, Alloy Iron and Steel



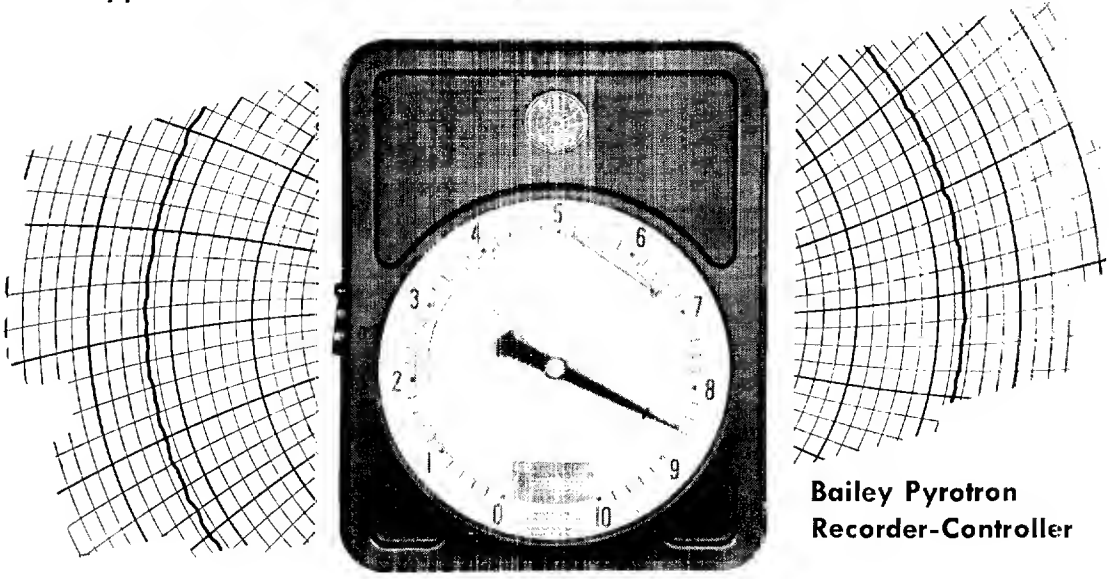
STEEL CASTINGS
20 to 250,000 Pounds

Continental

Continental
FOUNDRY & MACHINE CO.

CHICAGO · PITTSBURGH

Plants at: East Chicago, Ind., Wheeling, W. Va., Pittsburgh, Pa.



Bailey Pyrotron
Recorder-Controller

Looking for Better Temperature Instruments?

...Then check these features of Pyrotron Electronic Resistance Thermometers...

FUNDAMENTAL ACCURACY

Bailey Pyrotron Resistance Elements are made of highest purity platinum—the material used by the National Bureau of Standards in establishing basic standards for temperatures from −190°C to +660°C.

THREE TYPES OF CONTROL

Pyrotron Controllers may operate: on-off electrical systems by either electronic relays or electric contacts, modulated electronic systems, or air-operated systems. Two temperatures may be recorded on the same chart and controlled by a single instrument.

FACTS PUT INTO USABLE FORM

Bailey Pyrotrons may be arranged to put temperature facts into convenient usable forms. If two or more temperatures are related, they may be recorded as continuous records on the same chart for easy comparison. The average of several temperatures or the difference between two temperatures may be recorded as a single continuous record which may be retransmitted to a distant point or used to actuate a control system.

EASY INSTALLATION

Bailey Pyrotrons do not require careful leveling or protection against vibration. Three ordinary copper wires are all that is needed to connect each temperature sensitive element with the recorder. Power may be taken from any 115 volt 60 cycle circuit.

MINIMUM MAINTENANCE

The absence of galvanometers, batteries and standardizing equipment, together with the use of interchangeable unit assemblies, reduces Pyrotron maintenance to the vanishing point.

ABUNDANT POWER

A separate motor drive for each temperature furnishes abundant power to operate a recording pen, a controller and an alarm switch.

For the full story on this unusual electronic resistance thermometer which is suitable for ranges between −300°F and 1200°F, ask for Bulletin No. 230-C. P-21

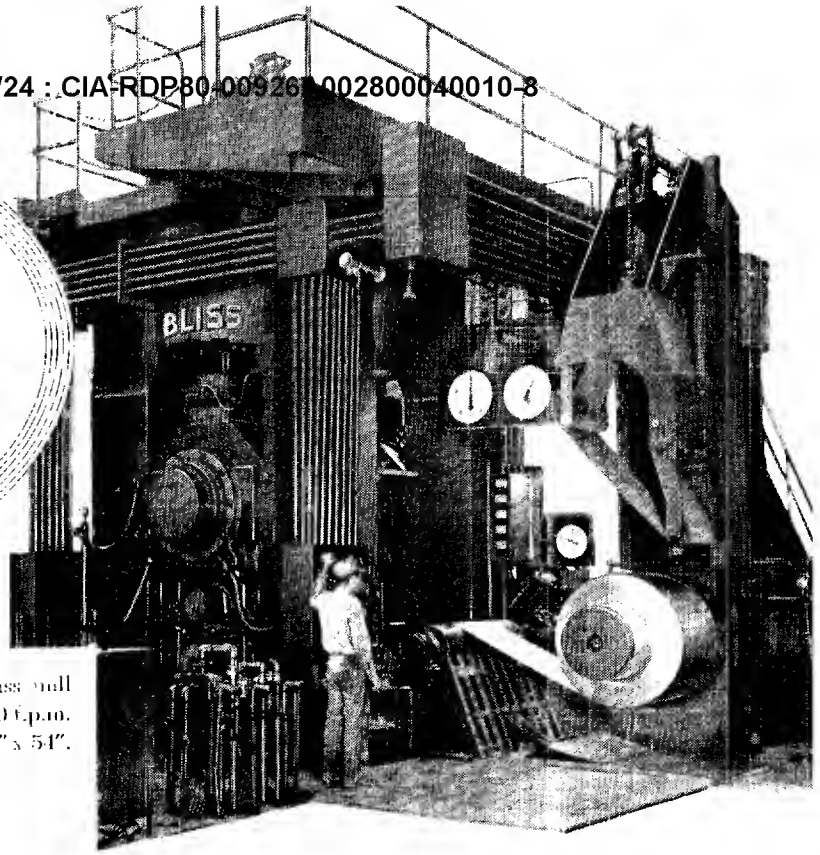
BAILEY METER COMPANY

1049 IVANHOE ROAD • • • CLEVELAND 10, OHIO

Controls for Processing

TEMPERATURE FLOW
PRESSURE LEVEL
% OXYGEN DENSITY
% COMBUSTION RATIO

South's Leading Steel Plant Specifies Bliss Again!



This new Bliss temper-pass mill rolls 20-gauge steel at 3,000 f.p.m. It is four high, 21" and 54" x 54".

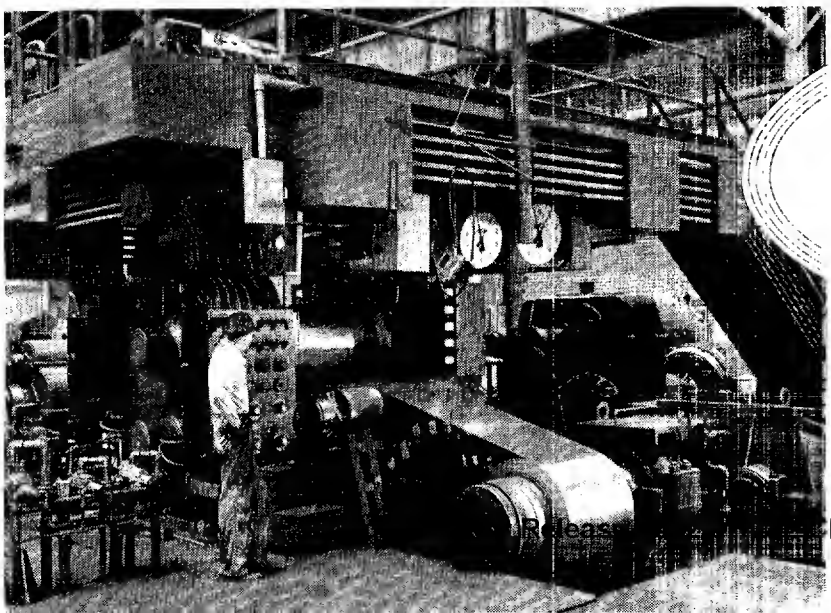
This four-high temper-pass mill and a two-high sheet and coil mill are the latest additions to the complete array of Bliss rolling mill machinery, producing quality steel and tinplate at the South's leading steel plant.

Both Bliss mills have operated continuously since early 1949 to keep pace with the company's growing demands from Southern industries. They have met every test in finish rolling a full range of steel from 30 to 13 gauge, 20" to 48" wide, at maximum speeds. Last month the four-high mill rolled a record 652 tons in an eight-hour day.

Tinplate (750 tons daily) is rolled to can-makers' precise "Specs" for flatness and temper in five Bliss two-stand tandem mills installed in 1938. They are delivering production even beyond rated capacity.

In hot working, too, rugged Bliss mills are key equipment. A scale breaker and six-stand, four-high tandem mill reduce hot steel slabs at the rate of 2,000 feet per minute.

Next time you need rolling mills or accessories call a Bliss engineer. He will be glad to analyze your equipment problem and submit recommendations without obligation.



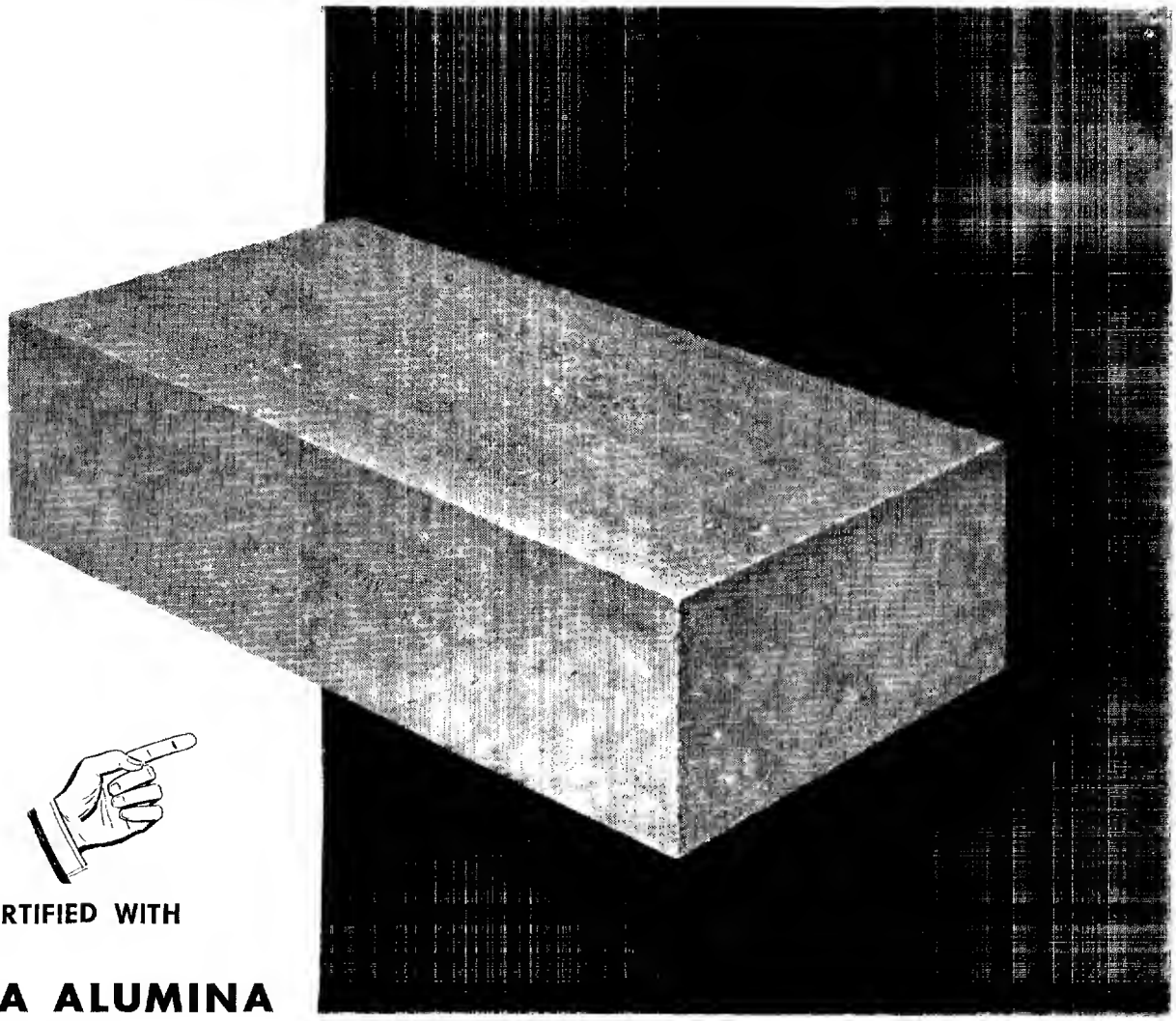
Both sheet and coil steel, from 30 to 13 gauge—20" to 48" wide—are finish

E.W. Bliss Company

General Office: Toledo 7, Ohio

Rolling Mill Division

Salem, Ohio



FORTIFIED WITH

ALCOA ALUMINA

THIS REFRACTORY BRICK HAS A WIDER RANGE OF USEFULNESS

Refractories made from fire clay, diaspore, kyanite and sillimanite are improved by fortifying their natural alumina content with ALCOA Alumina. Their maximum operating temperatures are raised . . . high-temperature, load-bearing strengths are increased . . . and resistance to chemical attack is greater. *These improvements give the refractories a wider range of usefulness!*

Performance characteristics improve in almost direct ratio to the alumina content of each refractory.

Fortifying refractories with ALCOA Alumina is easy. But to obtain the maximum service qualities, the grade of ALCOA Aluminum most suited to the job should be used.

We do not make refractories, but we shall be glad to discuss with you the characteristics and properties of the various grades of ALCOA Alumina, and recommend the one best suited to *your* purpose. Write to ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION 623J Gulf Building, Pittsburgh 19, Pa.

Alcoa Chemicals

ALCOA ALUMINUM ®

ALUMINAS and FLUORIDES

ACTIVATED ALUMINAS · CALCINED ALUMINAS · HYDRATED ALUMINAS · TABULAR ALUMINAS · LOW SODA ALUMINAS ALUMINUM FLUORIDE · SODIUM FLUORIDE · SODIUM ACID FLUORIDE · FLUOBORIC ACID · CRYOLITE · GALLIUM

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ENGINEERING AND FOUNDRY
COMPANY

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Plants at
PITTSBURGH, VANDERGRIFT, NEW CASTLE, YOUNGSTOWN, CANTON

Subsidiaries:
Adamson United Company, Akron, Ohio
Lobdell United Company, Wilmington, Delaware
Stedman Foundry and Machine Company, Inc., Aurora, Ind.

Designers and Makers of Rolls and Rolling Mill Equipment

to help you get

Metal Tight Refractory Linings

Here, written just for iron and steel men, is a new bulletin showing how the life of fire-clay brick linings can be greatly lengthened in ladles, hot metal cars, mixers, malleable furnaces, and other steel mill applications.

Every steel man who is looking for a joint or coating refractory material in these applications to retard slag accumulation on fire brick, reduce inclusions in metal, increase the number of heats before repair, and get easier removal of skulls in ladles, should have a copy of this bulletin. Steel men, who want to reduce tear-down time and get longer lining life with less maintenance, need this bulletin. Your copy of Bulletin 101A will be sent to you promptly upon your request. Write for it.

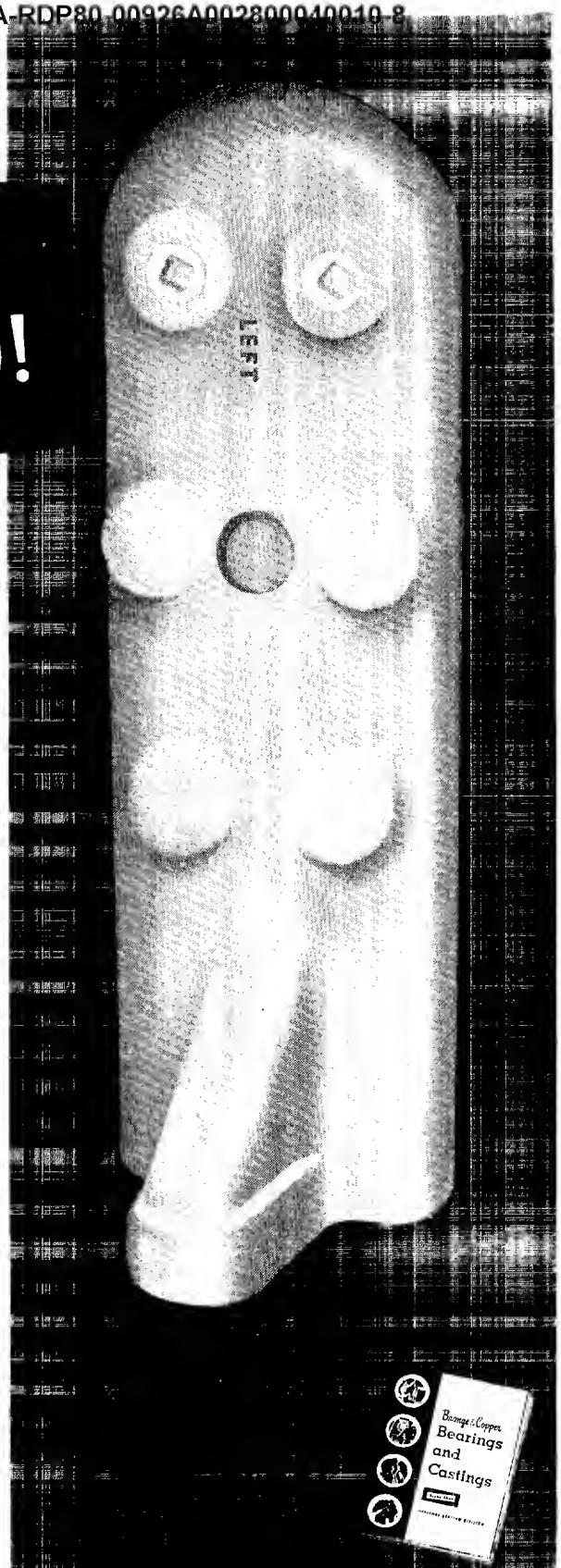
Quality First

Laclede-Christy Company

[illegible] • 2600 Forbes St. • Pittsburgh 19, Pa.
[illegible] St. Louis 1, Missouri

Branch Offices: NEW YORK • INDIANAPOLIS • CHICAGO • MILWAUKEE • HOUSTON • LOS ANGELES • SAN FRANCISCO • SEATTLE

THIS CASTING SAVED $12,000.00!



Why an Electrode Holder, redesigned by National Bearing Division, lasted over 73 times longer

A large Midwest plant was getting 5 days service from furnace electrode holders . . . before a trial order was placed with National Bearing Division. This plant saved dollars—*right from the start.* A special copper alloy permitted sound, dense castings at no sacrifice in electrical conductivity. Result? *30 days service—instead of 5—before replacement.*

On the next order, National Bearing Division engineers submitted a new design for the clamp—for greater strength and resistance to cracking. The redesigned electrode holders are still in use—after a year of trouble-free operation! They've saved $12,000.00 on replacement costs and furnace maintenance.

Better, longer-lasting non-ferrous parts can save money in your plant or product . . .

National Bearing Division has complete facilities for finding practical, economical solutions to non-ferrous bearing and casting problems. Investigate these complete facilities—whether your problem requires designed engineering service, or production of non-ferrous parts to your own specifications.

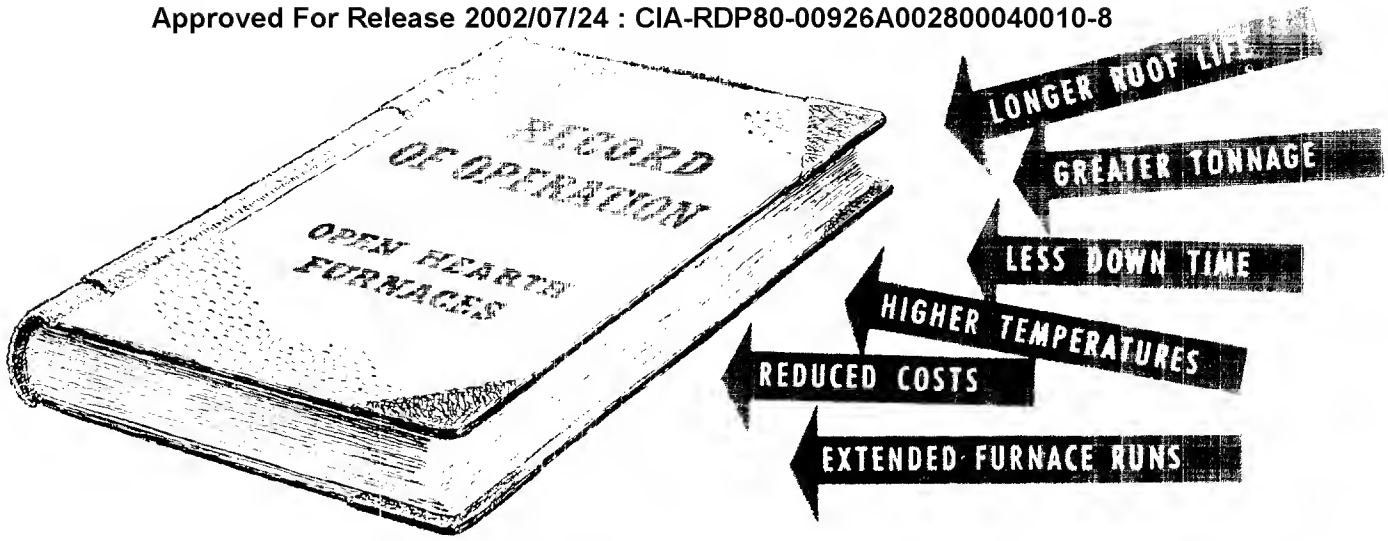
NBM

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

4935 Manchester Avenue • St. Louis 10, Mo.

PLANTS IN: ST. LOUIS, MO. • MEADVILLE, PA. • NILES, OHIO • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

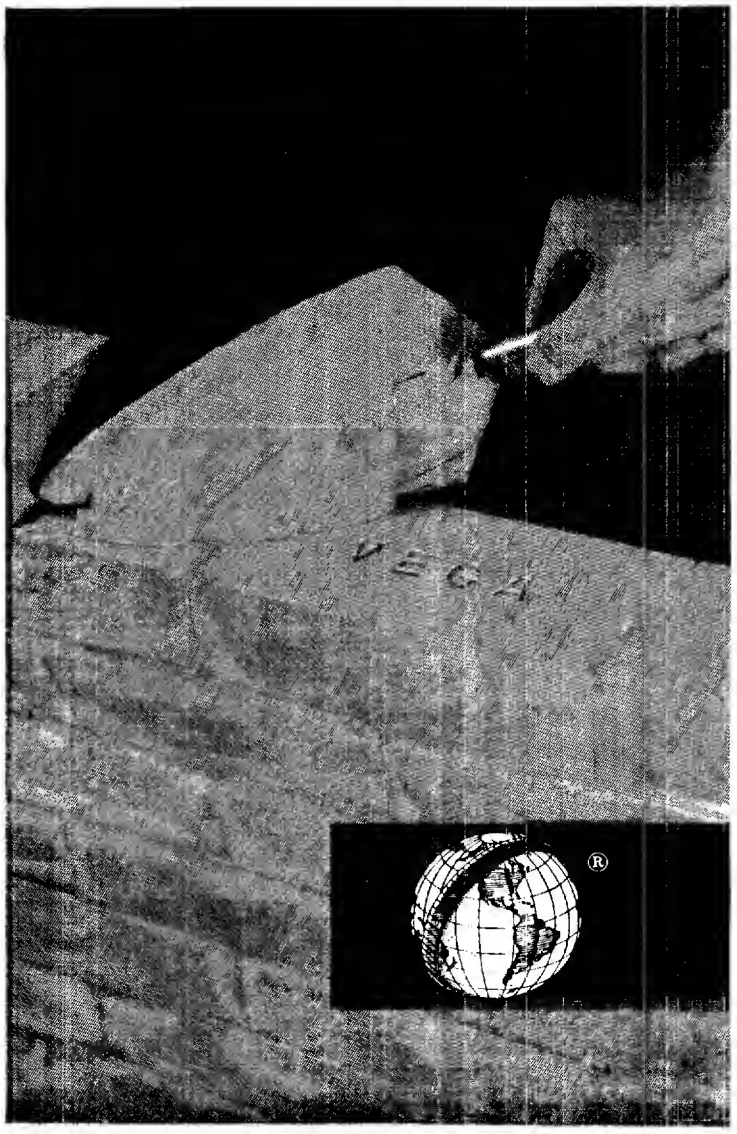


Operating records prove

Matched properties make VEGA BOND the ideal bonding material for VEGA refractories

VEGA BOND is a super-duty silica cement developed primarily for use with VEGA brick, particularly where conditions are unusually severe. It is highly plastic, smooth working, spreads evenly and develops a firm ceramic set at working temperatures. Vega Bond is the close counterpart of Vega Brick in composition and in the properties of refractoriness and thermal expansion.

It does not shrink to make a joint that recedes, nor expand beyond the silica brick and thus make a loose joint. It makes a thin, full-contact joint, but can be mixed to a thicker consistency if required for leveling courses.



that VEGA makes possible increased production...reduces costs

Experience with Harbison-Walker VEGA demonstrates that this super-duty silica brick has a longer life and permits higher operating temperatures, thus increasing tonnage output and reducing costs. Where conditions are most severe, the advantages provided by VEGA brick are most apparent.

Open hearth roof life has been extended 20-30% when Vega has been used in place of conventional silica brick; electric furnace sidewall life has been doubled. Higher temperatures can be maintained in furnaces built with Vega—or longer runs made at regular temperatures. In any case, the net result is greater production and reduced costs.

In the original development of Vega Brick, many years of thorough laboratory research were coupled with trials made under severe operating conditions to work out the product that is now rendering outstanding service in steel-making furnaces.

For open hearth roofs and electric furnace roofs and sidewalls, Vega—the Harbison-Walker super-duty silica refractory—can make new records for you!

the Harbison-Walker super-duty silica brick

Harbison-Walker Refractories Company
AND SUBSIDIARIES

WORLD'S LARGEST PRODUCER OF REFRACTORIES

General Offices . . . Pittsburgh 22 Pennsylvania

Production—Increased production of 100% in the smaller pipe sizes due to maximum speed increase from 500 f.p.m. to 1,000 f.p.m.

Cutting—New, continuously running rotary type flying Hot Saw entirely eliminates high maintenance of conventional reciprocating type saws. Cuts to closer tolerances. Operates at twice the speed of hot saws now in use.

Efficiency—Furnace efficiency has been greatly improved. By utilizing wider skelp than in older installations, you have much lower B.T.U. per ton of skelp heated.

Quality—Improved weld by greatly increased reductions in this 12-stand Forming and Welding Mill.

Other Features—1. New Rotary type kickout for high pipe speeds. 2. Hot straightening in line of production. 3. Screw type cooling bed.

Aetna-Standard builds more Continuous Butt Weld Pipe Mills and Seamless Tube Mills than all other companies combined. Ask us about the 12-stand butt weld mill, the newest advance in pipe making.

THE AETNA-STANDARD ENGINEERING COMPANY

YOUNGSTOWN, OHIO

ASSOCIATED COMPANIES

AETNA-STANDARD ENGINEERING CO., LTD., TORONTO, ONTARIO, CANADA
HEAD, WRIGHTSON & COMPANY, LTD., THORNABY-ON-TEES, ENGLAND
SOCIETE DE CONSTRUCTIONS DE MONTBARD, 6 RUE OARU, PARIS (8e) FRANCE

AETNA-STANDARD'S NEW **12-STAND MILL**

REVOLUTIONIZES.. **PIPE MAKING**

Eagle-Picher Insulation can help you get maximum heat and power from each fuel dollar expended

Here's insulation that will save you money

EAGLE-PICHER DE-85 BLOCKS

A highly efficient, rigid-type insulating material composed almost entirely of pure, lightweight, Eagle-Picher Diatomaceous Earth. High physical strength enables these blocks to stand up well under handling and usage normally encountered in installation. Adaptable to virtually all types of heated equipment. Can be cut with a knife, or sawed, to fit irregular shapes. DE-85 Blocks for temperatures to 1300°F. DE-95 Blocks for temperatures to 2000°F.

EAGLE-PICHER "99" FINISHING CEMENT

Finishing cement for temperatures up to 1000°F. Adheres tightly to hot or cold surfaces with practically no shrinkage. Highly durable. Gives a smooth, hard, light-colored, paintable surface.

EAGLE-PICHER STALASTIC
(Boiler Wall Coating)

Effectively seals against air infiltration through boiler settings—seals cracks and pores, effects substantial fuel savings. Great adhesive strength, retains its elasticity. For temperatures up to 400°F.

An Eagle-Picher Industrial Insulation distributor or representative can help you reduce operating expenses because he has available a wide line of insulation products for high and low temperatures—scientifically designed for maximum thermal efficiency, and practical application. Why not let him give you more information about some of the products listed here?

These Eagle Picher products can save you money . . . power . . . time

Insulating Felts • Supertemp Blocks • Blankets
Loose Wool • Pipe Covering • Stalastic • Insulseal • Insulstic
Swetchek • Finishing Cements • Insulating Cements
Fireproofing Cement • Diatomaceous Earth Blocks

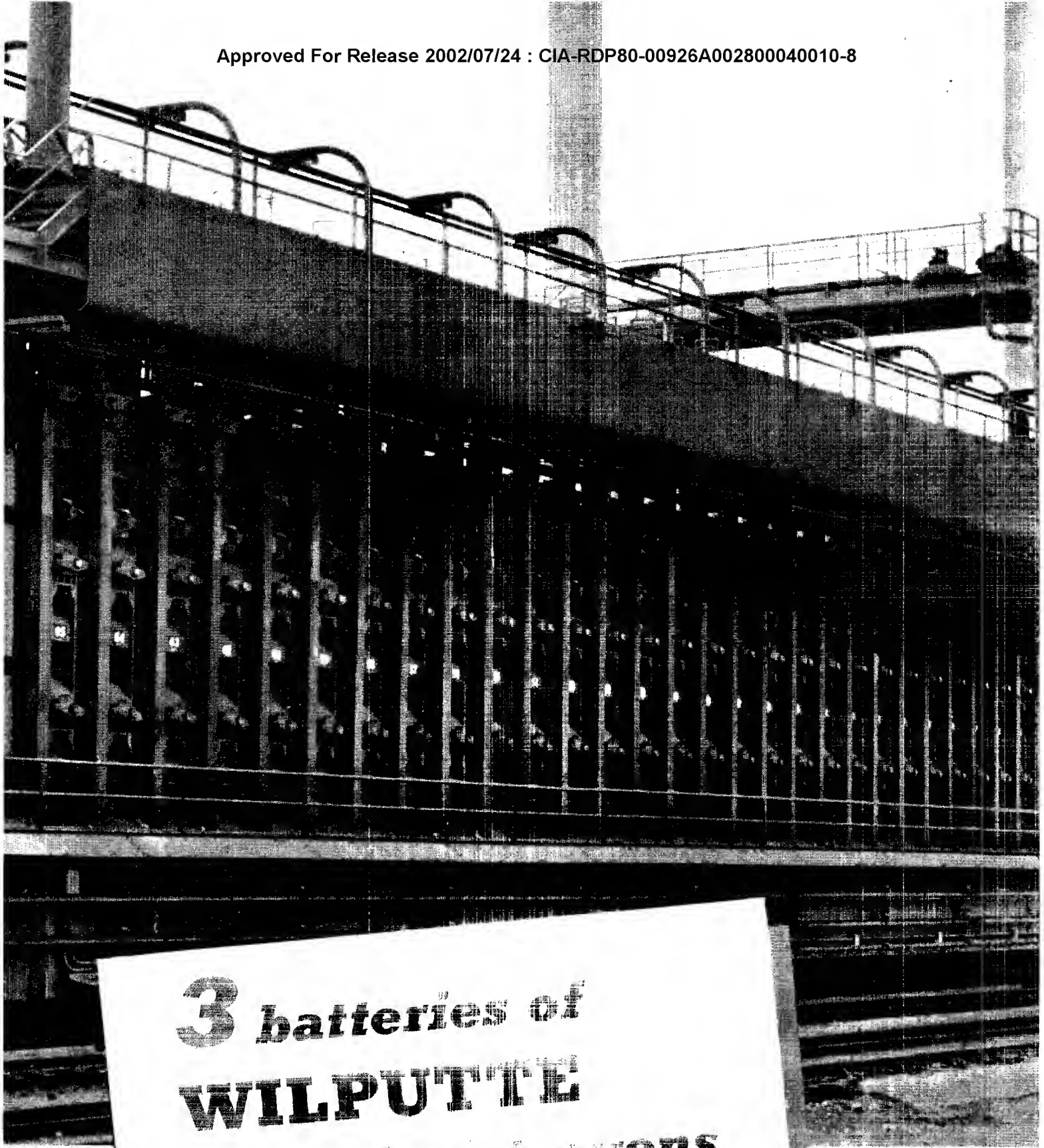
THE EAGLE-PICHER COMPANY

General Offices: Cincinnati (1), Ohio

Insulation products of efficient mineral wool—for a full range of high and low temperatures. Technical data on request.

EAGLE PICHER

Since 1843



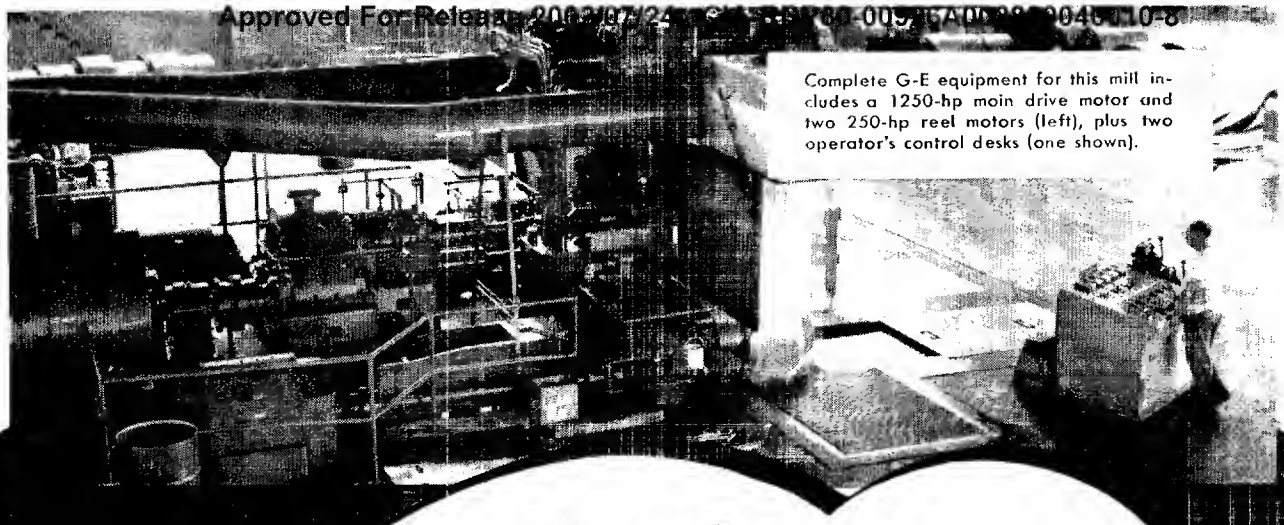
WILPUTTE

177 Wilputte Underjet Ovens installed for National Tube Company Lorain Works at Lorain, Ohio in 1947.

COKE OVEN DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET • NEW YORK 6, NEW YORK



Complete G-E equipment for this mill includes a 1250-hp main drive motor and two 250-hp reel motors (left), plus two operator's control desks (one shown).

G-E drive for 24" reversing cold-strip mill

maintains strip uniformity, simplifies threading and jogging, boosts "on gage" tonnage!

Here's another in a long list of General Electric steel-mill drives engineered for close quality control, ease of operation, and high output. Installed on a 24" 4-high reversing cold-strip mill in Detroit Steel Corporation's Eastern Mill Division, New Haven, Conn., this drive

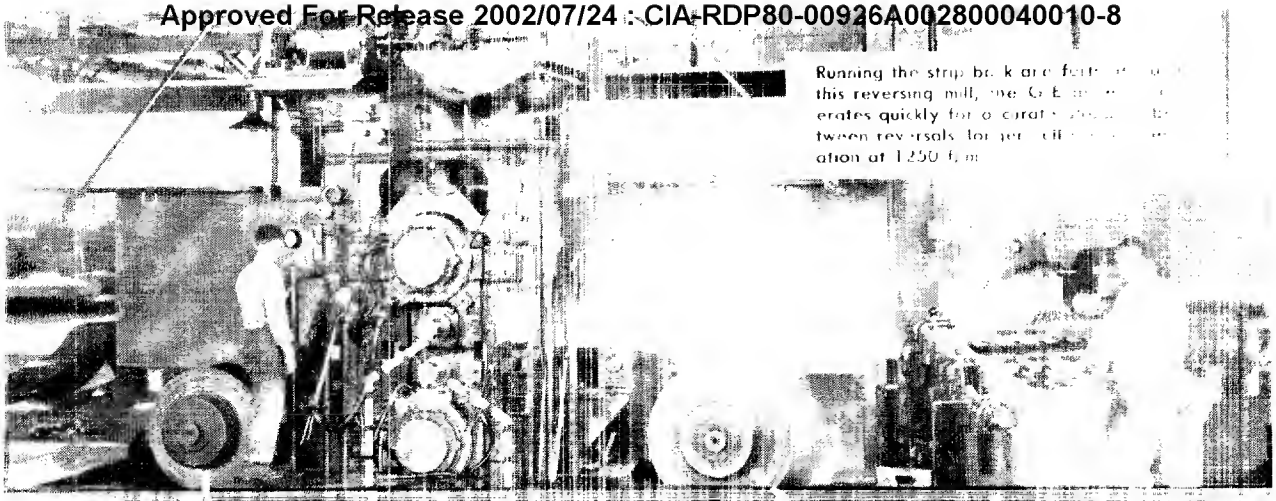
Holds uniform tension at all speeds, which provides uniform gage and surface, reduces strip breakage and roll marking.

Operates either unit independently, in either direction, without disturbing the other. This simplifies threading, permits holding stalled tension on one reel while jogging the other into position.

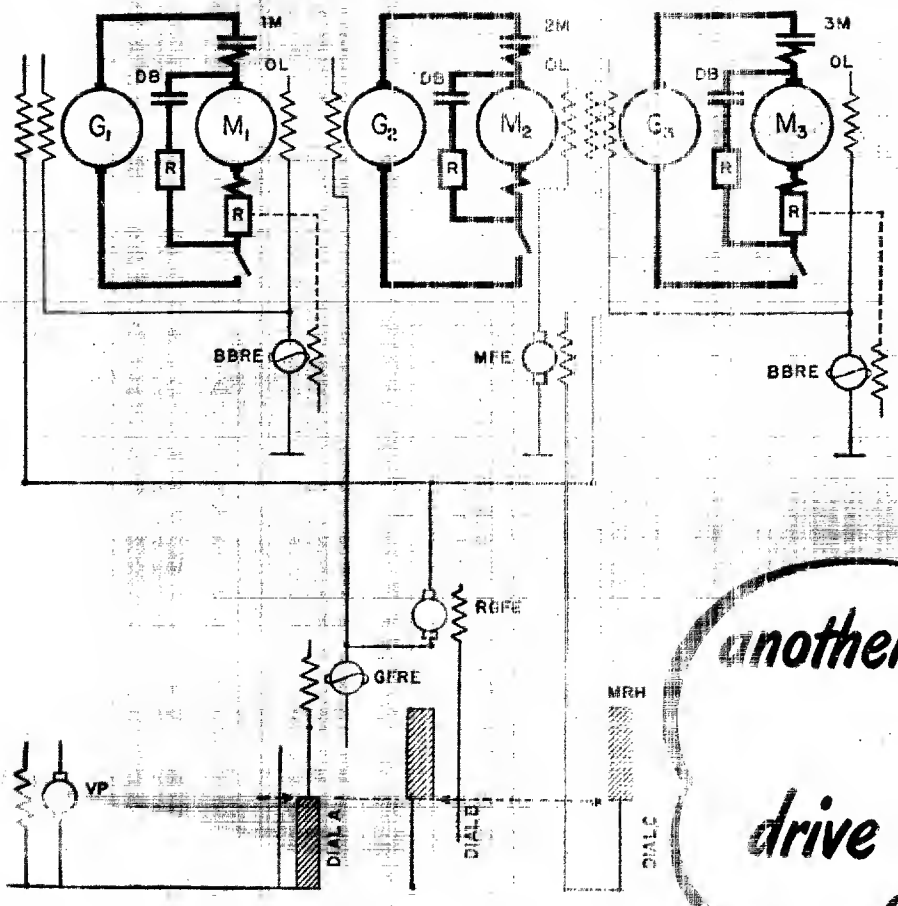
Accelerates and decelerates rapidly at a uniform, reliable rate from any speed, assuring accurate stopping between reversals, longer operation at top speed. Strip gets "on-gage" faster, stays "on-gage" longer!

It's one more example of General Electric's ability to handle *your* steel-mill drive problems successfully. Why not ask a G-E steel-mill specialist to discuss them with your engineers? *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC



Running the strip back and forth [illegible] this reversing mill, the G E [illegible] erates quickly for accurate [illegible] between reversals for per[illegible] ation at 1250 f.p.m.



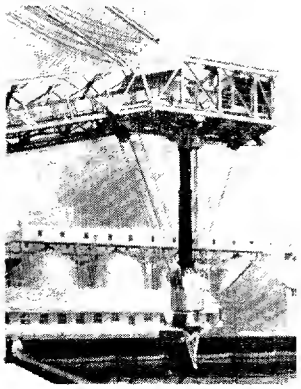
another example of

drive engineering at work!

Loading, Unloading and Conveying Equipment Designed and Built by Heyl & Patterson

Nearly three years ago when Alcoa Steamship Company decided to build a Bauxite Ore Transfer Station at Point Tembladora, Trinidad, the planning was a challenge to both Alcoa and Heyl & Patterson Engineers.

Among the many factors to be considered were: (a) The extremely high cost of power, (b) the need for a high loading and unloading rate, (c) how to keep the bauxite dry, (d) how to handle the peak loads when both unloading towers would be unloading from the same ship, (e) how to control completely all motions of the bucket, (f) how to provide satisfactory voltage over an extremely long runway, (g) how to give the operator in the cab complete visibility, (h) how to assure safety in the hold for the workers helping in the unloading operation, (j) how to keep dust to a minimum.

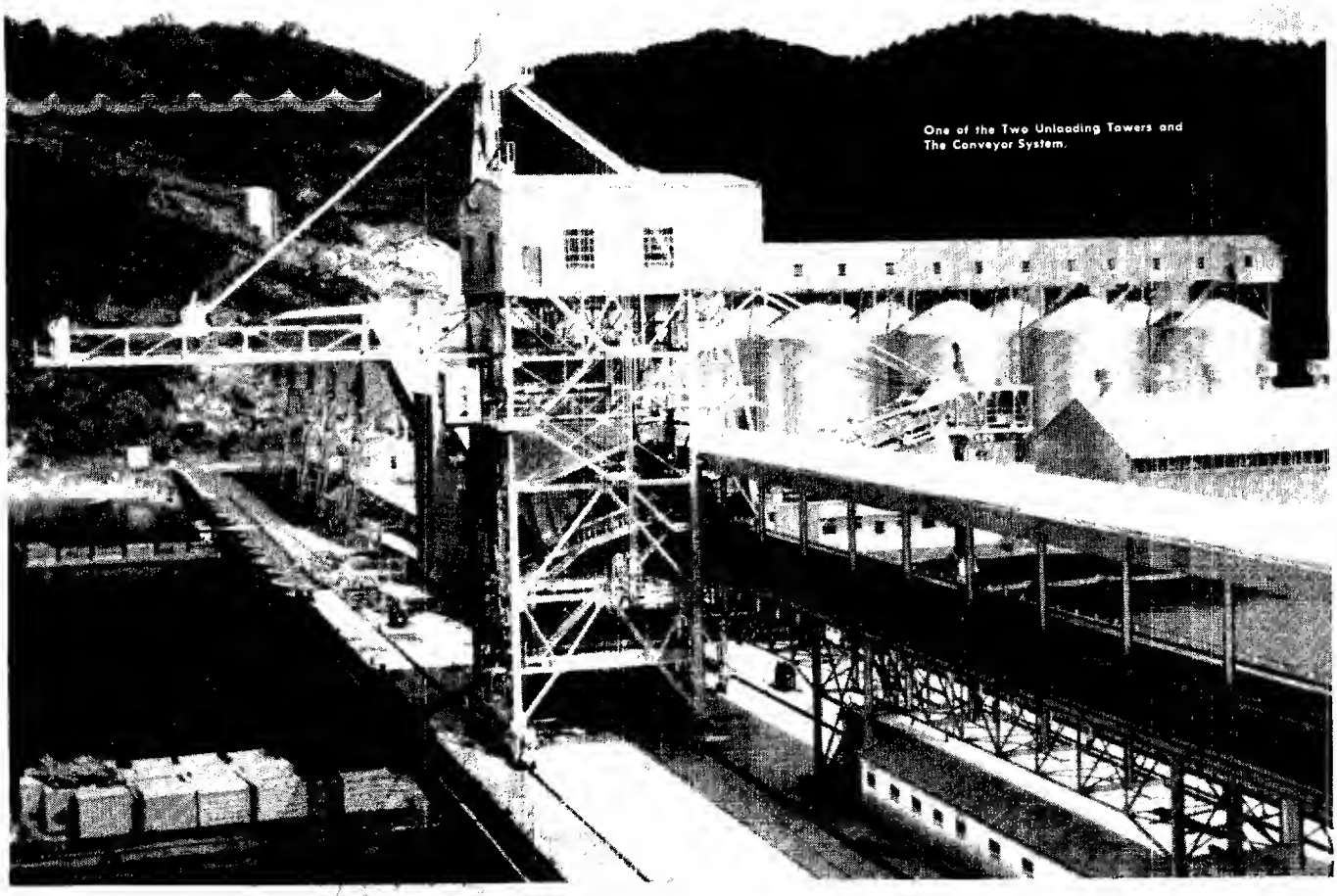


A Close-up of the Loading Boom, Chute and Trimmer.

With a mutual understanding of the problems, Alcoa and H&P engineers made an organized approach to the study of the equipment and the economies of the handling methods involved. The result is, as shown in the illustrations, the completed Bauxite Ore Transfer Station that loads and unloads bauxite in the fastest possible time . . . at the lowest possible cost.

Like any Heavy Bulk Materials Handling Equipment project that H&P designs and builds, the Loading Tower, the two Unloading Towers and the Conveyor System were individually engineered to meet the successful operation requirements of Alcoa Steamship Company.

The Loading Tower has a capacity of 2000 tons per hour and the two Unloading Towers, working simul-



One of the Two Unloading Towers and The Conveyor System.

taneously fore and aft, unload shuttle vessels at the rate of 1000 tons per hour.

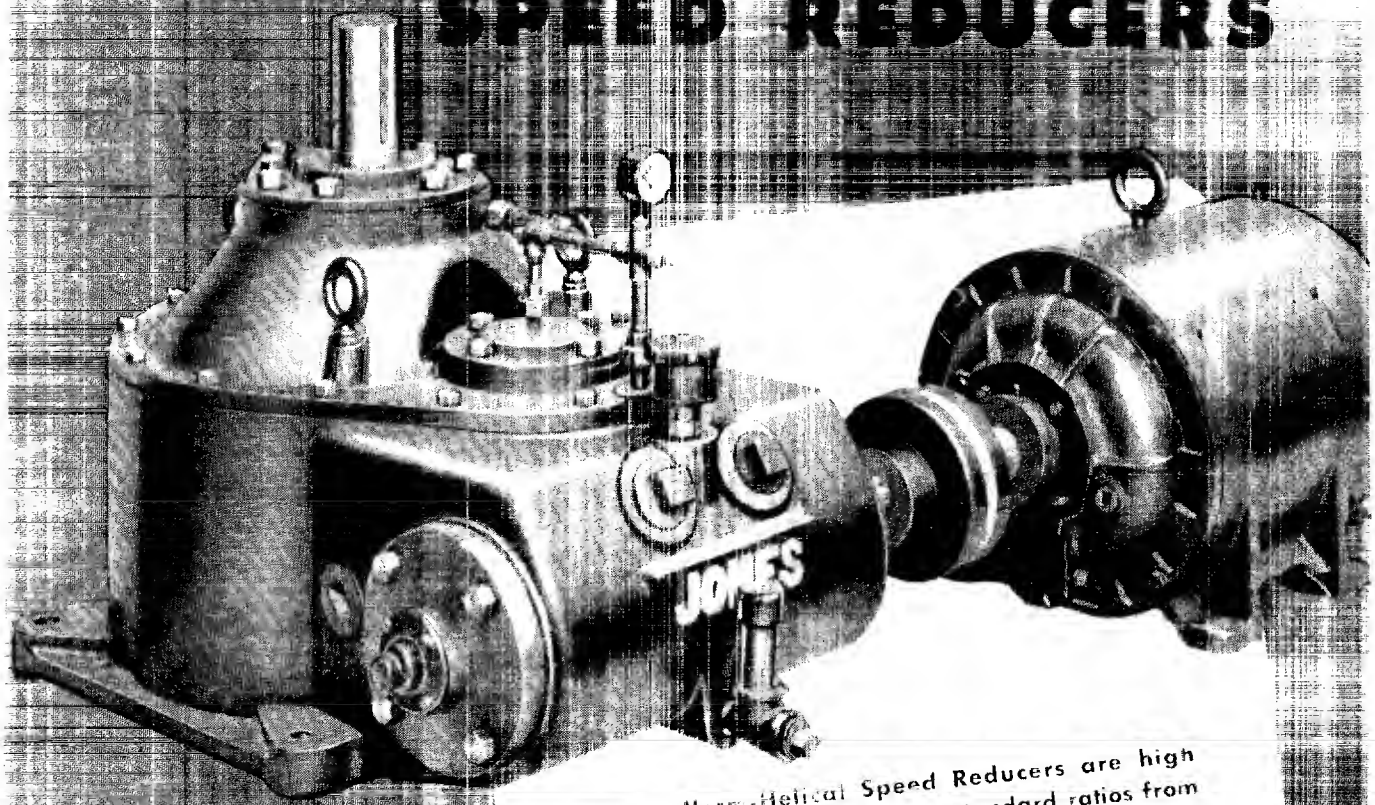
Each of the Unloading Towers is a rope trolley rig using a 6 ton bucket operating on a 30 second cycle. All motions of the bucket are controlled by varying the voltage generated on each tower. Power is fed to the towers at 440 volt 3 phase 60 cycle. It is converted to variable D.C. voltage for each motion by means of a 28,250 pound Fly Wheel Type MG set. The machinery house, in which the MG set and the bucket and trolley engines are mounted, is located at the top of each tower, 85 feet above dock level.

The operator's cab, carrying all master switches controlling the operation of the tower, is mounted on a heavy ram and is moved out over the hold of the vessel over which the Tower is working. Whenever the Tower is to be moved from one vessel to another the Cab can be retracted to its traveling position immediately against the front portal. The operator of the Cab has a full view of the hold at all times and thus is able to guard against the bucket hitting anyone who may be working in the hold.

Since Bauxite must be kept dry, ordinary methods of keeping dust to a minimum by sprinkling could not be used. The space above the hopper where the bucket is dumped is completely enclosed, top and three sides, with only the front being left open to permit entrance of the bucket. All chutes and transfer points are covered.

Jones

WORM-HELICAL SPEED REDUCERS



Jones Worm-Helical Speed Reducers are high efficiency units, built in fifteen standard ratios from 40 to 1 to 250 to 1 for all common motor speeds. They are ideal for vertical shaft drives to agitators, mixers, feeding rolls, etc.

The low speed shaft can be extended up or down. For coupling connection or gear drive.

Bulletin No. 75 covers complete details.

W. A. JONES FOUNDRY & MACHINE CO.
4429 Roosevelt Rd., Chicago 24, Ill.

60 YEARS 1890 1950

Since 1890

Jones

In The Service Of Industry

HERRINGBONE-WORM-SPUR-GEAR SPEED REDUCERS
PULLEYS • GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • FLEXIBLE COUPLINGS

Twelve years of continuous research, experimentation and actual installations in cooperation with several leading steel companies have produced record tonnages where complete KX-99 Blast Furnace Linings were installed.

The properties of KX-99 give you one refractory for the entire furnace lining including the bottom hearth, bosh, inwall, and top:

BURNED TO ORTON CONE 23

1. No sign of carbon monoxide disintegration in 100 hour test at 900° F. In all completed furnace campaigns, no carbon monoxide disintegration was found.
2. Apparent porosity in the range of 8 to 12 per cent with an average of 10 per cent.
3. Bulk density in the range of 2.30 to 2.40 grams per cubic centimeter.
4. Average modulus of rupture 1800 to 2500 pounds per square inch.

KX-99 Blast Furnace Brick *are manufactured to extremely close tolerances — uniform in dimensions — free from warpage and variations.*

OUR 40TH YEAR
SERVING THE
WORLD'S INDUSTRIES

A. P. Green
REFRACTORY PRODUCTS

A. P. GREEN FIRE BRICK COMPANY
Mexico, Missouri, U. S. A.

In Canada:
A. P. GREEN FIRE BRICK COMPANY, Ltd.
Toronto 15, Ontario

COMPLETE LININGS CARRIED IN STOCK FOR IMMEDIATE SHIPMENT

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE

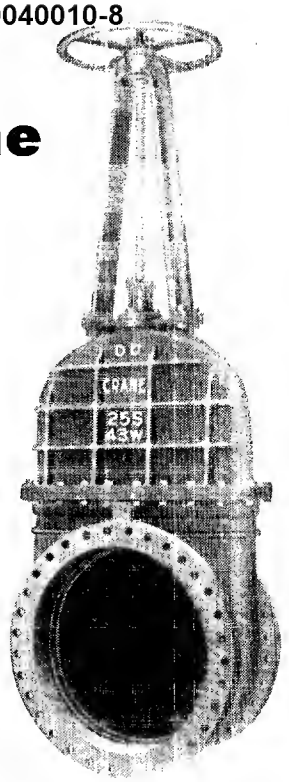
How to simplify your piping jobs ...Standardize on the CRANE line

ECONOMICAL VALVES FOR LOW PRESSURES

Keep Crane 25-Pound Iron Body Double Disc Gates in mind for services that don't require the usual 125-Pound valves. Rated at 25 Pounds Steam or Gas, and up to 50 Pounds Water, depending on size, they give superior service in a wide variety of applications. Use them inside or out; their oval-shaped body and bonnet have ample reserve strength under line stresses. Short and compact, they take minimum space in pipe lines.

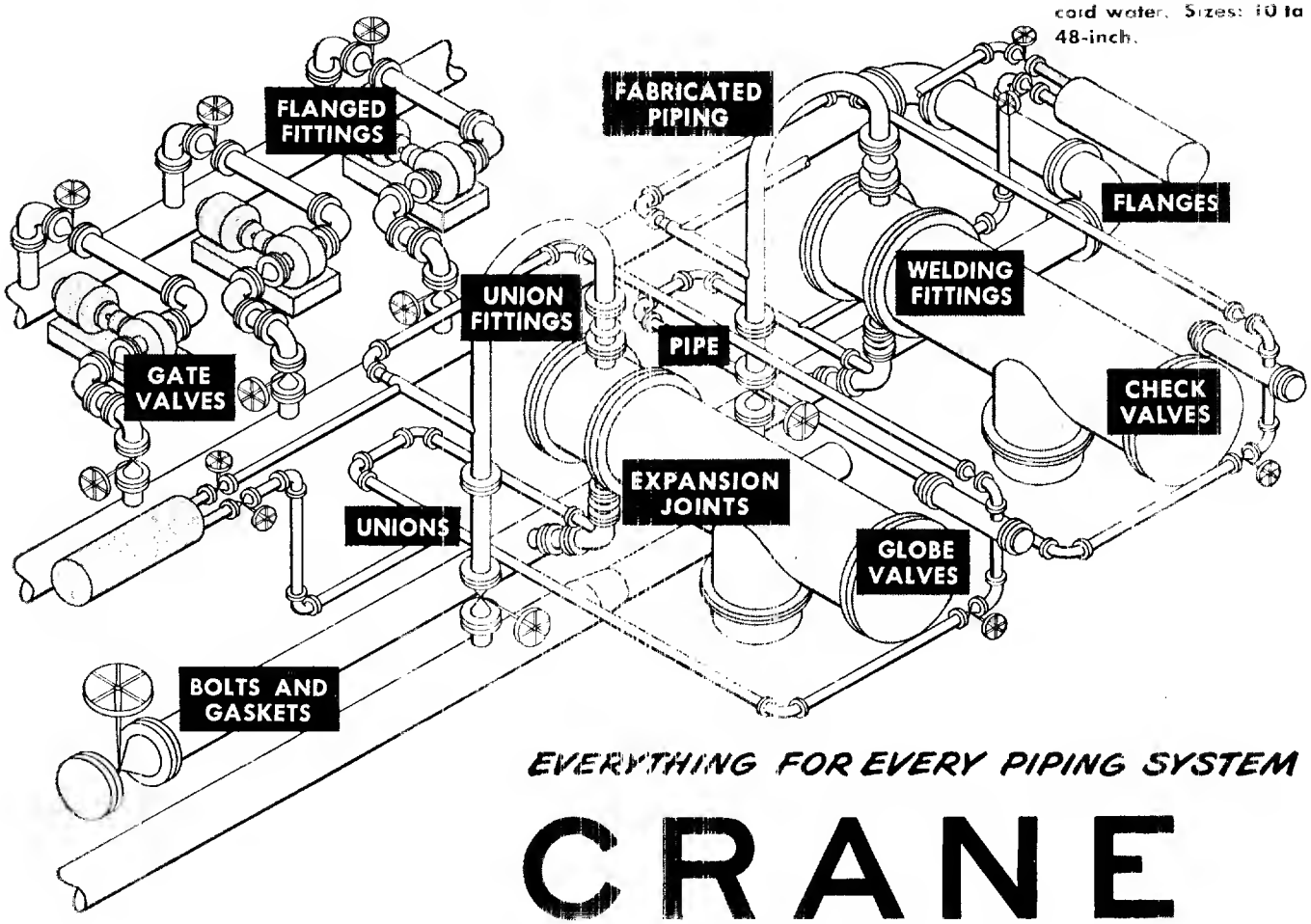
For durable, tight seating—yet easy opening—seat rings and disc faces are brass. Crane 2-piece ball-type gland maintains uniform pressure on packing; prevents binding on stem; lengthens packing life. When specified, these valves can be fitted with gears, by-pass, and clean-outs; also can be motor or cylinder operated; non-rising stem, flanged or hub ends, up to 36-in., O.S. & Y. type with flanged ends only up to 48-in. See your No. 49 Crane Catalog.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas



No. 793½. Outside Screw and Yoke. Working Pressures: 25 pounds steam or gas; up to 50 pounds cold water. Sizes: 10 to 48-inch.

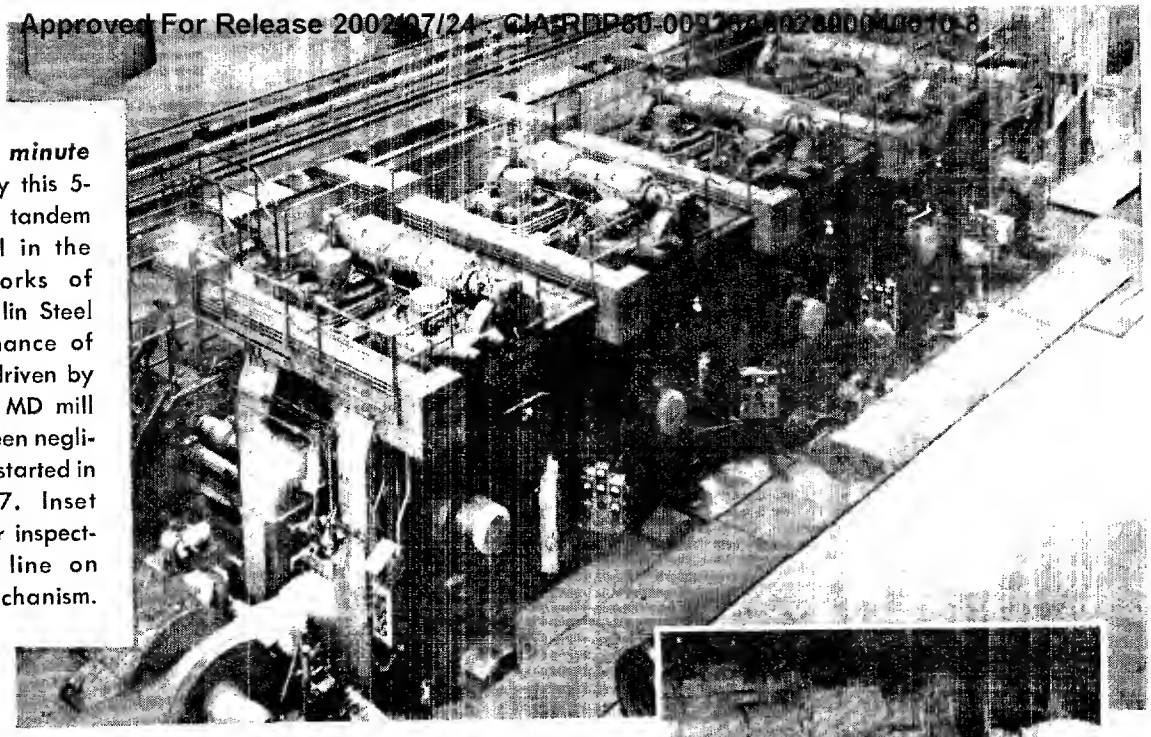
ONE ORDER TO CRANE COMPLETELY EQUIPS CIRCULATING, COOLING AND SERVICE WATER PIPING SYSTEMS



EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING



6250 feet per minute is record set by this 5-stand 42-inch tandem cold strip mill in the Aliquippa Works of Jones & Laughlin Steel Corp. Maintenance of screwdowns—driven by 10 G-E 75-hp MD mill motors—has been negligible since mill started in October 1947. Inset shows operator inspecting oil feed line on screwdown mechanism.

Less maintenance

ON WORLD'S FASTEST STRIP MILL!

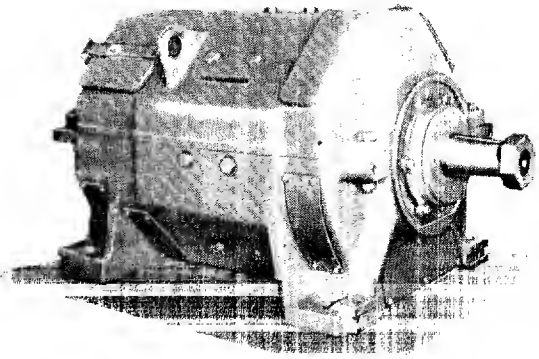
G-E d-c mill motor for extra-heavy duty provides extra convenience features like these:

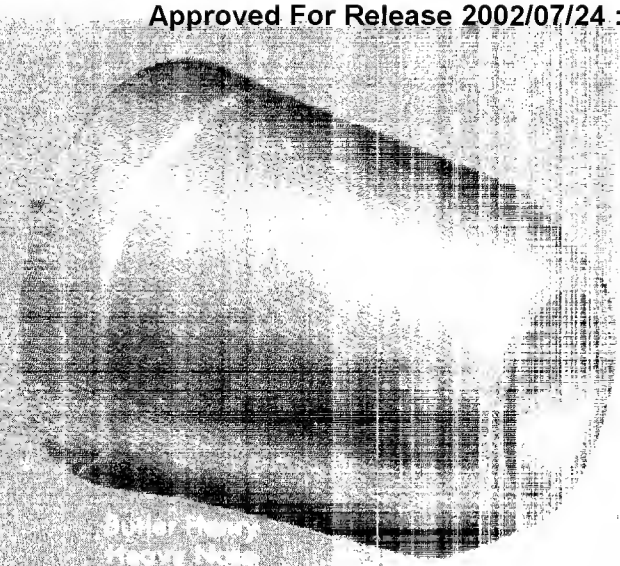
- Wide commutator opening gives easy access to entire brush holder without opening frame
- Hinged top, on most frame sizes, swings open full 180 degrees simplifies inspection
- Bearing caps are easily removed for bearing inspection without disassembling motor
- Mounting feet on armature frame heads permit resting on floor eliminate need for supporting blocks
- Pressure-relief greasing system with easy-to-get-at fittings facilitates lubrication

And much more besides:

- Sturdy, compact construction that provides more hp in the same AISE frame size
- Base is easily converted with standard covers to provide five types of enclosures, saving cost of extra standby motors and storage space
- Plus many other features that add up to long motor life and dependability. Write for Bulletin GEA-4654. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

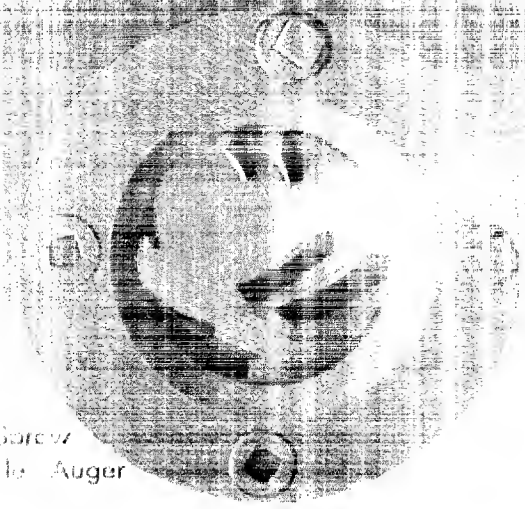
MD-600 MILL MOTORS





Screw
Double Auger

Butterfly
Heavy Nose



Blast Furnace
TUYERES

Double Auger

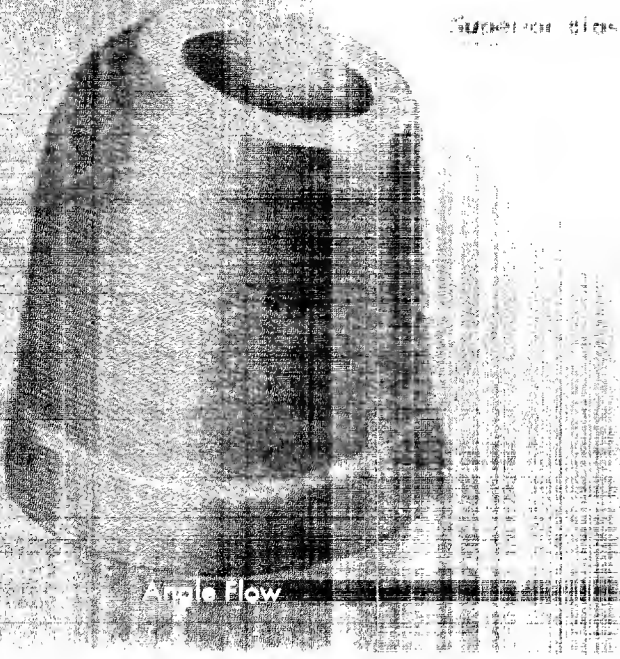
Butterfly Heavy Nose

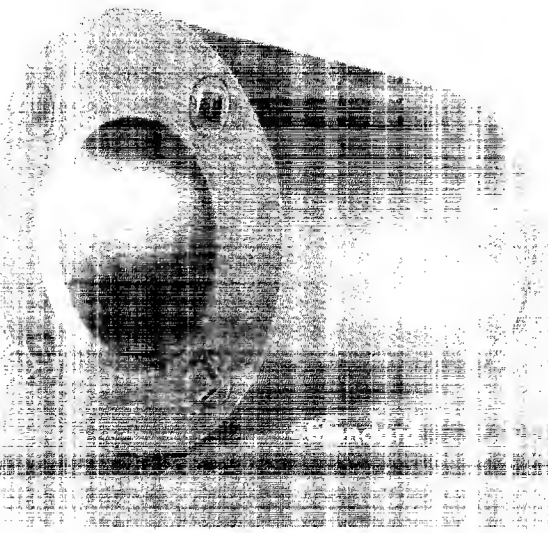
Ample Flow

Standard

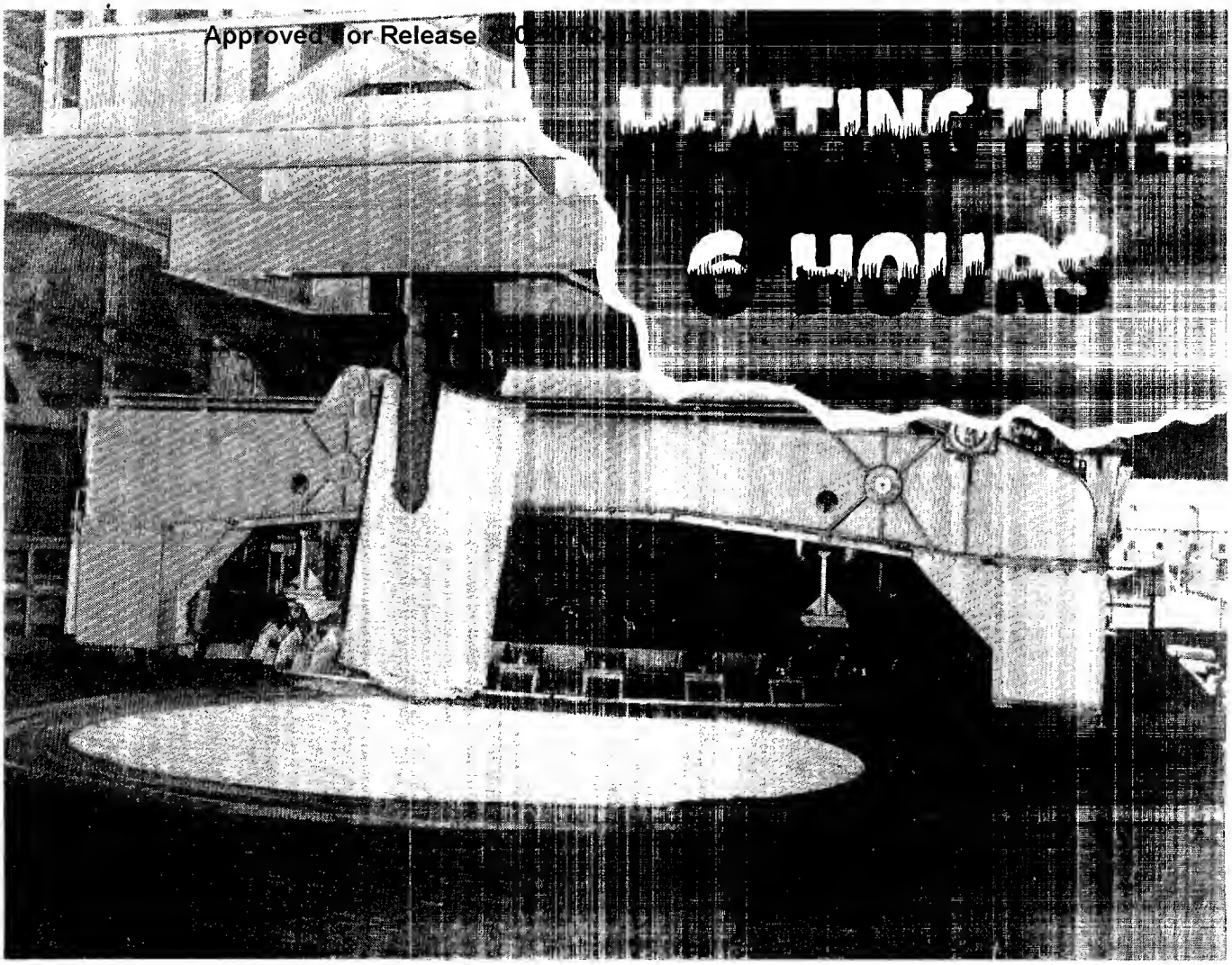
SMITH-HAMWOOD COMPANY

Superior Blast Furnace Copper Castings Exclusively





Ample Flow



*C*harged black-cold, this six ton steel ingot and 11 others like it were heated to 2300 degrees in just six hours in this efficient Salem circular soaking pit. Hundreds of these circular soaking pits are helping the steel industry boost production around the world.

Salem's pits have an enviable reputation for uniform heating, operating economy, easy charging position and high quality production.

For complete details, write without obligation.

SALEM BUILDS

Salem circular soaking pits, rotary hearth furnaces, car bottom furnaces, forge furnaces, heat treating furnaces, gas atmosphere furnaces, air recirculating furnaces, needle metallic recuperators, continuous butt-weld furnaces and mechanical equipment for charging and discharging furnaces.

Salem Engineering Company

HEADQUARTERS FOR HEAT TREATING DESIGN

Salem, Ohio

SALEM ENGINEERING (CANADA) LTD., TORONTO, ONT.
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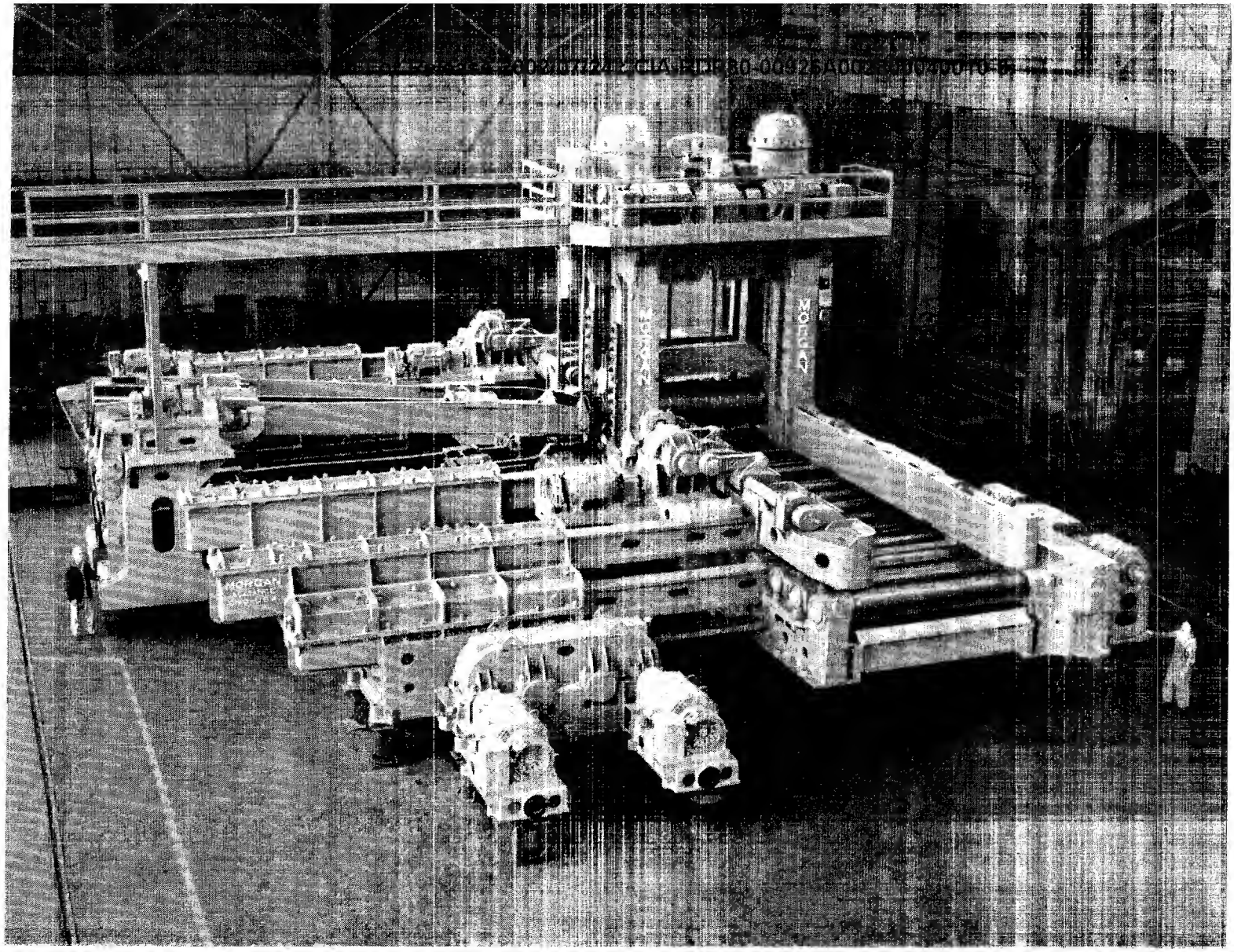

44" TWIN MOTOR DRIVE BLOOMING MILL

Morgan 44"—2 High Reversing Blooming Mill to be direct connected to two 4000 H.P., 50/120 Rpm. Motors. Top roll and both spindles are hydraulically balanced by individual cylinders connected to an air hydraulic system. Speeds of motor driven screw down, feed rollers, mill tables and manipulator are regulated by variable voltage control.

Mill tables have box type cast steel girders. Rollers are forged steel equipped with anti-friction type bearing cartridges. All gears have hardened teeth, are totally enclosed and operate in oil. Manipulator is of the electric overhead type with retractable heads affording maximum accessibility to all parts of the mill tables.

We design and build mills and mill machinery for the steel industry. For your next mill and equipment, consult —

MORGAN *Engineering*

THE MORGAN ENGINEERING CO.

ALLIANCE, OHIO PITTSBURGH—1420 OLIVER BUILDING

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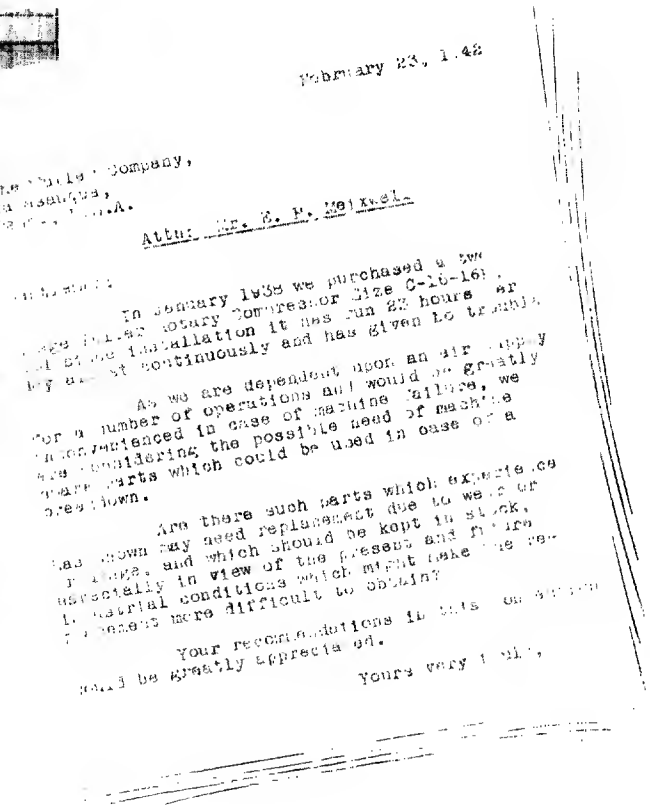
FULLER ROTARY COMPRESSORS

For Heavy Duty 100-125-Lb. Pressure



February 23, 1.42

The ... Company,
Ca...sauqua,
Pa... U.S.A.

Attn: Mr. E. F. Weiwel

In January 1938 we purchased a two ... Fuller rotary compressor Size C-16-16 ... the installation it has run 22 hours ... by and is continuously and has given ... trouble.

As we are dependent upon an air supply for a number of operations and would be greatly inconvenienced in case of machine failure, we are considering the possible need of machine spare parts which could be used in case of a breakdown.

Are there such parts which experience has shown may need replacement due to wear or breakage, and which should be kept in stock, especially in view of the present and future material conditions which might make the replacements more difficult to obtain?

Your recommendations in this ... matter would be greatly appreciated.

Yours very truly,

We built 'em good in 1938 . . . and we're still doing it.

Here's a letter that tells a story better than any words we could use. Nor is it an exceptional case . . . hundreds of users of Fuller Rotary Compressors are reaping the same benefits. It further strengthens the claims we have been making . . . you too can profit by installing Fuller Rotaries.

There's every logical reason for long continuous service with these units. Simple, sturdy construction, a minimum of moving parts—rotor, bearings, blades.

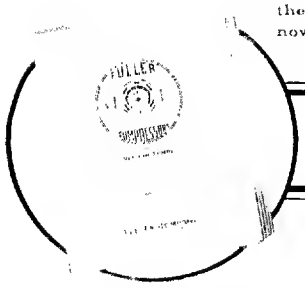
Shut-downs are costly . . . lost time can never be recovered . . . it's up to you to see that the very best equipment in installed in your plant.

The next time you are in the market for compressors or vacuum pumps get in touch with us.

No. 4 of a series

FULLER COMPANY
CATASAUQUA—PENNSYLVANIA
Chicago 3 - 120 So. LaSalle St.
San Francisco 4 - 420 Chancery Bldg.

Bulletin C-5 illustrates and describes these machines. Send for your copy now.



A LIFETIME OF NEW MACHINE EFFICIENCY

CAN'T STOP FOR BREATH

. . . that's why so many of them are served by dependable

Ingersoll-Rand Turbo-Blowers

Once started, a Blast Furnace should never be shut down until it needs relining. And to keep it "alive", air must be supplied *continuously*—night and day, month after month.

Blast Furnace operators know that they can't afford to take any chances on the dependability of their blower equipment. It's significant, therefore, that Ingersoll-Rand has supplied more than 150 of these heavy duty blast furnace Turbo-Blowers—totaling more than 1,250,000 horsepower.

This unequalled experience in Turbo-Blower design and construction is your best assurance of maximum *availability*, plus minimum power and maintenance costs.

Your nearest I-R representative will be glad to discuss your problem of compressing large volumes of air or gas to moderate pressures. Sizes: to 21,000 hp, to 110 psig and higher, to 155,000 cfm.

Ingersoll-Rand

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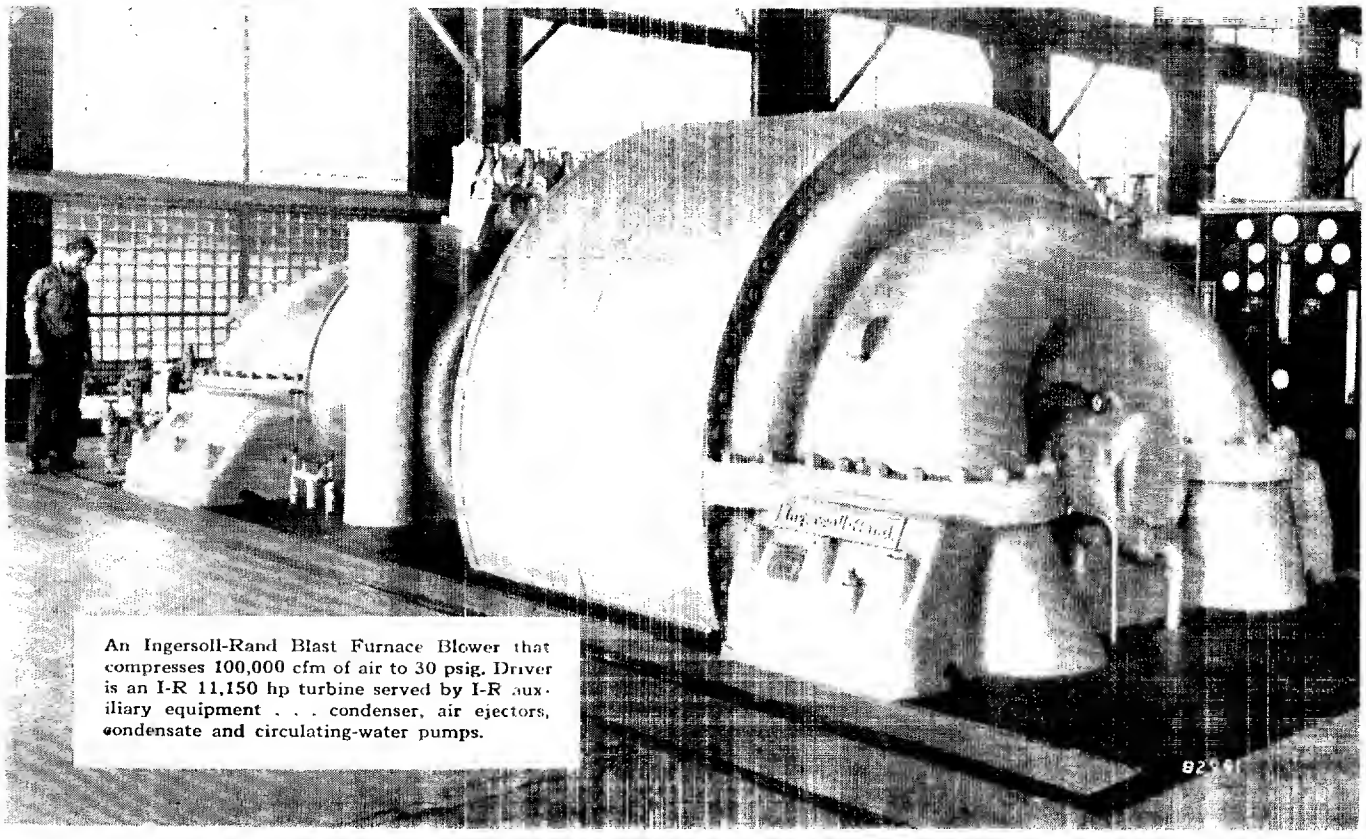
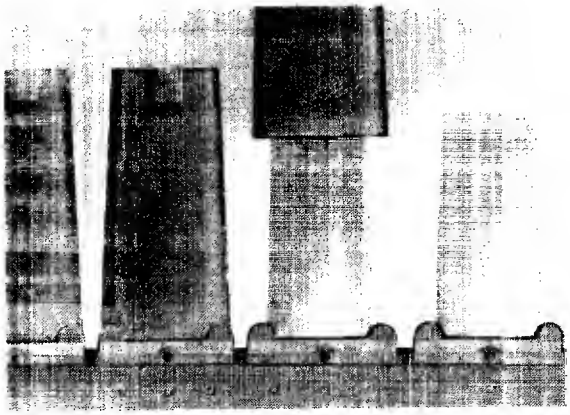


An Ingersoll-Rand Blast Furnace Blower that compresses 100,000 cfm of air to 30 psig. Driver is an I-R 11,150 hp turbine served by I-R auxiliary equipment . . . condenser, air ejectors, condensate and circulating-water pumps.

MEX COATS MOLDS FOR LESS THAN ¾¢ PER TON . . . stays in suspension

- Improves ingot surface — repels metal splash
- Non-toxic, gives off no fumes or odors when applied
- Speeds production because it stays suspended
- Equally effective when applied to "hot" or "cold" molds
- Easy to use — spraying equipment available on no-charge loan basis



MEXATOP

EFFECTIVE HOT-TOPPING COMPOUND . . . COSTS LESS THAN 2¢ PER INGOT TON

- Increases ingot yield — makes possible reduction in hot-top height and volume
- Spreads easily — Creates no odors, smoke or fumes.
- Insures less segregation and secondary "pipe" - no carbon pipe

Write today for full facts on MEX and MEXATOP! Other Mexican Graphite Products: NO. 8 MEXICAN GRAPHITE for ladle recarburizing . . . NO. 34-30 for Open Hearth charges . . . MEXALOY, the super refractory ingredient.

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FOR

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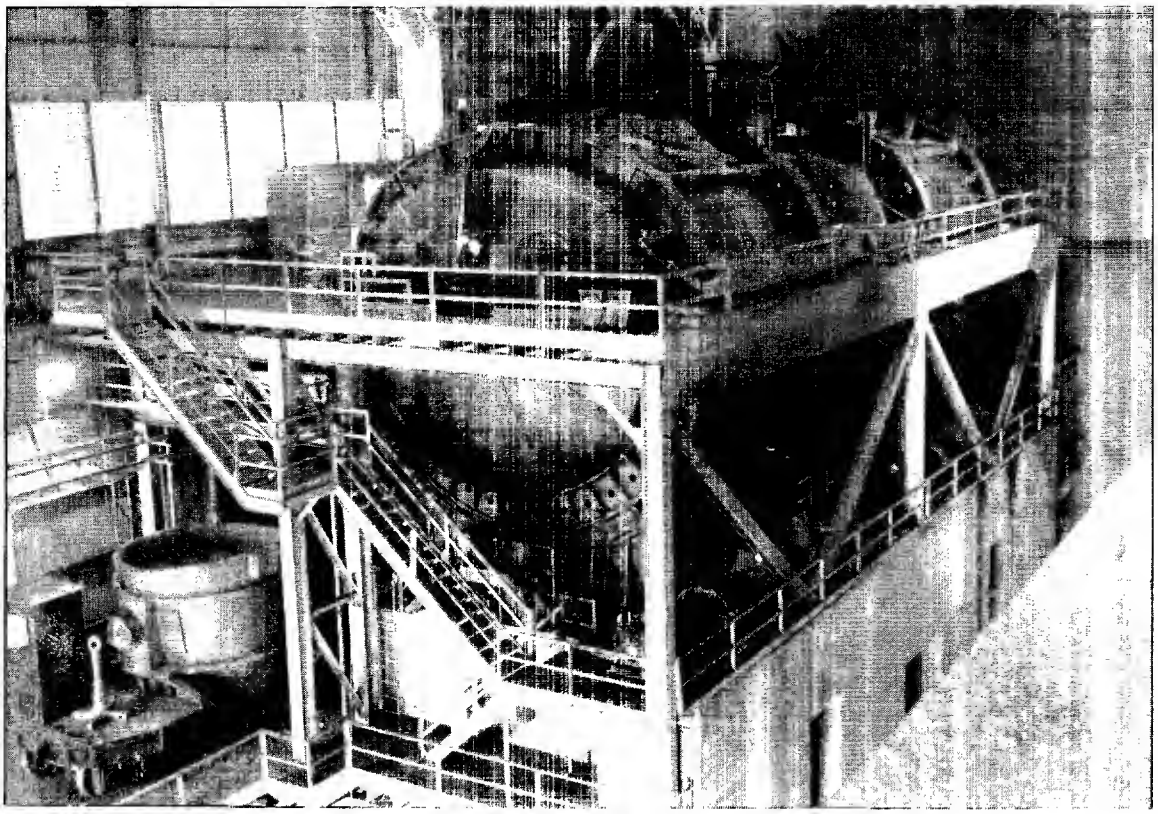

2 — 800 TON MIXER INSTALLED AT CARNEGIE-ILLINOIS' HOMESTEAD NEW OPEN HEARTH PLANT

Installation of Mixers

in the following steel plants

Wheeling Steel Corporation
Carnegie-Illinois Steel Corporation
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Jones and Laughlin Steel Corporation
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Bethlehem Steel Company
Algoma Steel Company, Canada
Youngstown Sheet and Tube Company
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Siderurgica del Mediterraneo, Spain
Inland Steel Company
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for Open Hearth and Bessemer plants

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Post Ladle Cranes
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Scrap Buckets
Charging Box Cars
Blast Furnaces

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ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Extra-Low-Carbon STAINLESS STEEL

New Type Chromium-Nickel Steels Have Added Corrosion Resistance

New and improved austenitic stainless steels of the 18-8 type have been developed which have superior corrosion resistance after being exposed to heat. These steels, known as extra-low-carbon stainless steels, were designed especially for use in welded and stress-relieved equipment that is exposed to more severe corrosive conditions than are normally encountered by other types of straight 18-8 stainless steel.

Under severe corrosive conditions, intergranular attack may occur in the higher carbon unstabilized grades of austenitic stainless steels that have been subjected to the temperature range of 800 to 1600 deg. F. during welding or hot forming operations. It is generally agreed that this type of corrosion is caused by complex carbides that are formed at the grain boundaries of the stainless steel during heating.

The effect of heat is rarely harmful in the ordinary fabrication of stainless steel for most applications, such as in architecture, the food and dairy industries, in hospitals, and in the home. However, in the chemical and other allied industries, where stainless steel is used in the handling of very corrosive chemicals, these new extra-low-carbon stainless steels should most certainly find wide use.

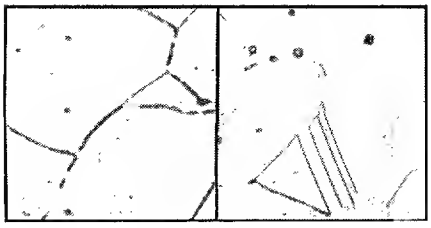

Fig. 1 Left: Carbide precipitation at the grain boundaries of an 18-8 stainless steel, containing 0.059 per cent carbon, after being held at 1200 deg. F. for 1 hour. Right: Absence of carbide precipitation in 18-8 stainless steel of 0.03 maximum carbon content, after being held at 1200 deg. F. for the same length of time.

In general, there are three ways in which the precipitation of carbides can be controlled in stainless steel:

1. Heat-treating so that the carbides present are dissolved.
2. Alloying with an element, such as columbium or titanium, that will tie up the carbon in the form of a harmless carbide.
3. Decreasing the carbon content of the steel.

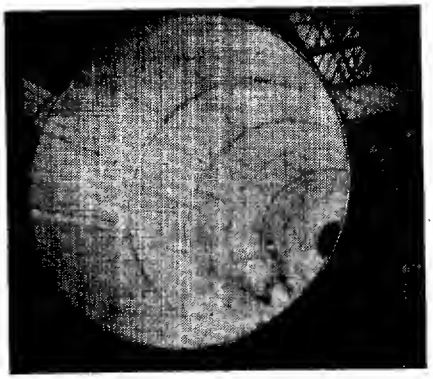

Fig. 2. The new extra-low-carbon stainless steels are especially suited for large types of process equipment, such as this fractionating tower. They require no heat-treatment after welding.

Heat-Treatment After Welding

Before the development of extra-low-carbon stainless steel, or of the "stabilized grades", one means for preventing intergranular corrosion was to heat-treat stainless steel that had been subjected to the dangerous temperature range, so that the precipitated chromium-carbides would go back into solid solution. It was found that when a welded part was heated to temperatures of 1950 to 2000 deg. F., and then cooled rapidly, most of the carbides were retained in solid solution. This extra heat-treatment is sometimes impractical, however, because of the design or massive size of some types of welded equipment.

Use of Columbium and Titanium to "Fix" Carbon

As the result of a search for a method of producing stainless steels that would be immune to intergranular corrosion without heat-treatment, the columbium- and titanium-bearing stainless steels were developed. These elements form carbides more readily than chromium. It was found that columbium, when present in a 10 to 1 ratio to carbon, completely "fixes" the carbon and renders it harmless in stainless steel. A similar effect can be accomplished by alloying with about five times as much titanium as carbon. Steels thus alloyed with columbium or titanium are known as "stabilized grades."

Decreasing Carbon Content

The most recent development in preventing intergranular corrosion has been the extra-low-carbon stainless steels. To be substantially harmless in stainless steel for as-welded or welded and stress relieved chemical equipment operating at temperatures under 700 deg. F., carbon must not be present in quantities over 0.03 per cent.

In 1937, ferrochrome with 0.03 per cent maximum carbon was first produced for the steel industry by ELECTROMET. This product has helped make it possible to produce very-low-carbon stainless steels—steels that are completely immune to intergranular corrosion when welded or subjected to a stress-relieving heat-treatment.

Metallurgical Service Available

If you use welded stainless steel equipment, it will pay you to investigate the advantages of using extra-low-carbon steels. If you produce stainless steel, our metallurgists will be glad to give you technical assistance in the use of ferrochrome of 0.03 per cent maximum carbon. For further information, write to the nearest ELECTROMET office.

For a more detailed account of the properties of extra-low-carbon stainless steel, write for a free copy of the technical paper, "Resistance to Sensitization of Austenitic Chromium-Nickel Steels of 0.03% Max. Carbon Content".

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.

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MESTA

MACHINE COMPANY

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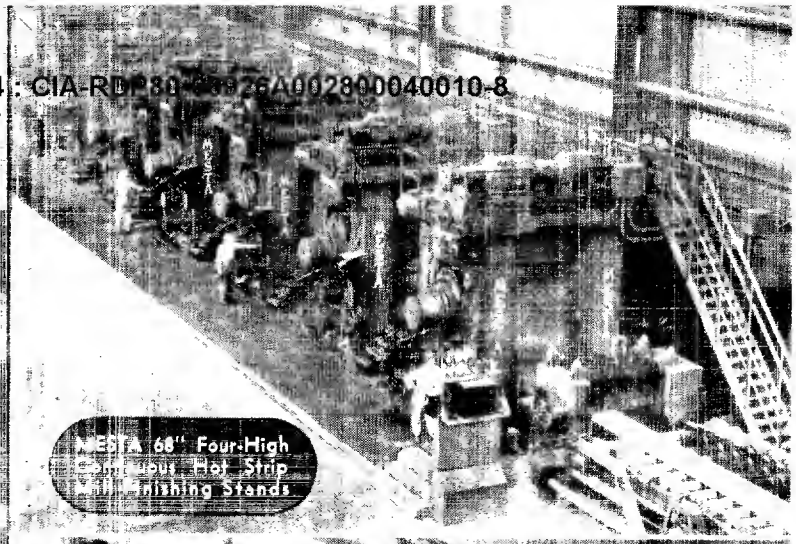
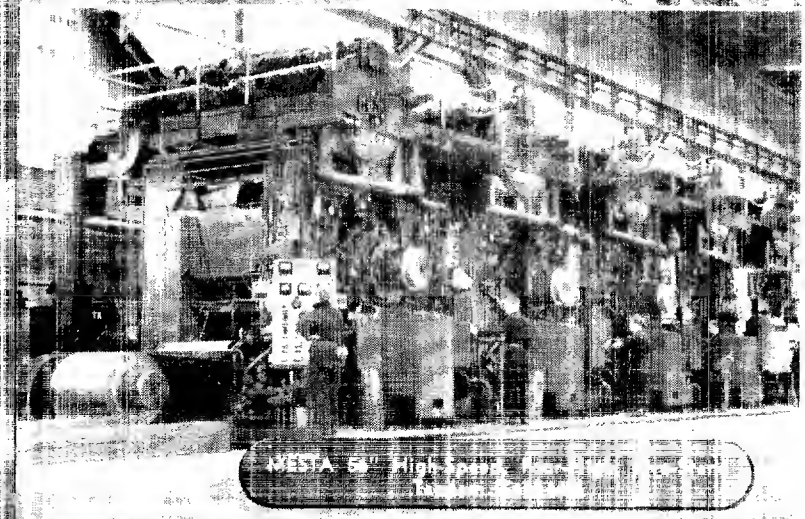
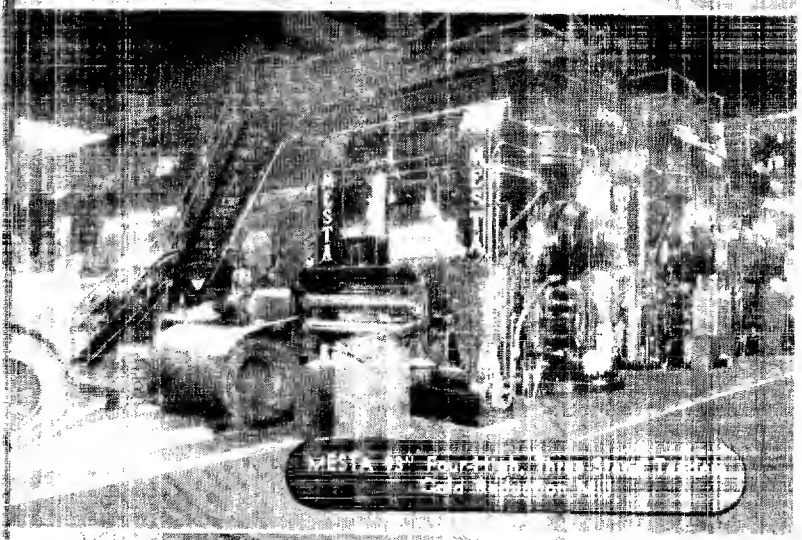
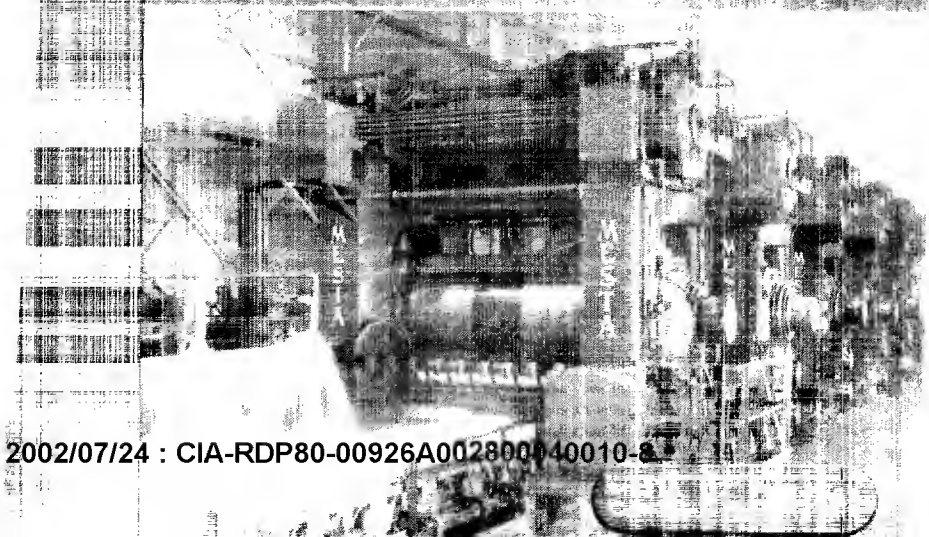
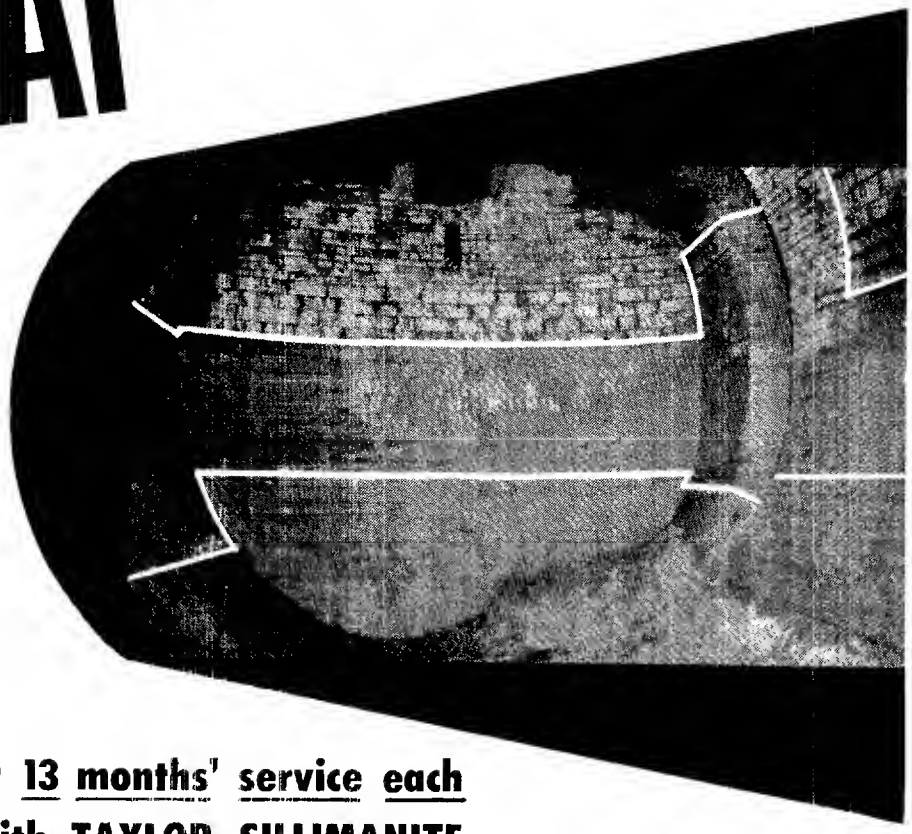








COMBAT JOINT EROSION IN HOT METAL MIXERS



Taylor Sillimanite (TASIL) Brick, laid with TASIL No. 301 Cement in the zones of excessive wear (a 13½" thick band around the front, back, end walls and floor of the pour-out spout, and 18" x 18" x 6" blocks for jambs of pour-out spout) is tripling the life of hot metal mixer linings.

Field reports show over 13 months' service each for two mixers lined with TAYLOR SILLIMANITE

Field report on 1000-ton mixer

This company has just completed the third campaign in which more than a million tons each have been tapped on Taylor Sillimanite balanced mixer linings. The last campaign totaled 14 months with not a single brick replaced for the first 12 months. The material and labor costs for the campaign were 20% lower than the best campaign on high-heat duty firebrick linings.

Field report on 500-ton mixer

Previous lining material lasted approx. four months, with less than one-half million tons produced. A Taylor Sillimanite lining has now been in service for 13 months, 9 days, without even a minor repair, handling around 2400 tons of iron per day.

- Despite higher first cost, Taylor Sillimanite Brick linings have paid for themselves through savings in material and masonry costs alone. The real saving however, is in the elimination of frequent mixer downtime. It will pay you in profits to discuss this TASIL application with your Taylor Field Representative.

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Today's conditions present a new challenge to the Steel Industry—a challenge that calls for maximum utilization of existing mills and processes, conservation of man power, improved safety, elimination of waste motion, fewer delays and lower production costs. Modern materials handling equipment can contribute substantially toward the attainment of these objectives.

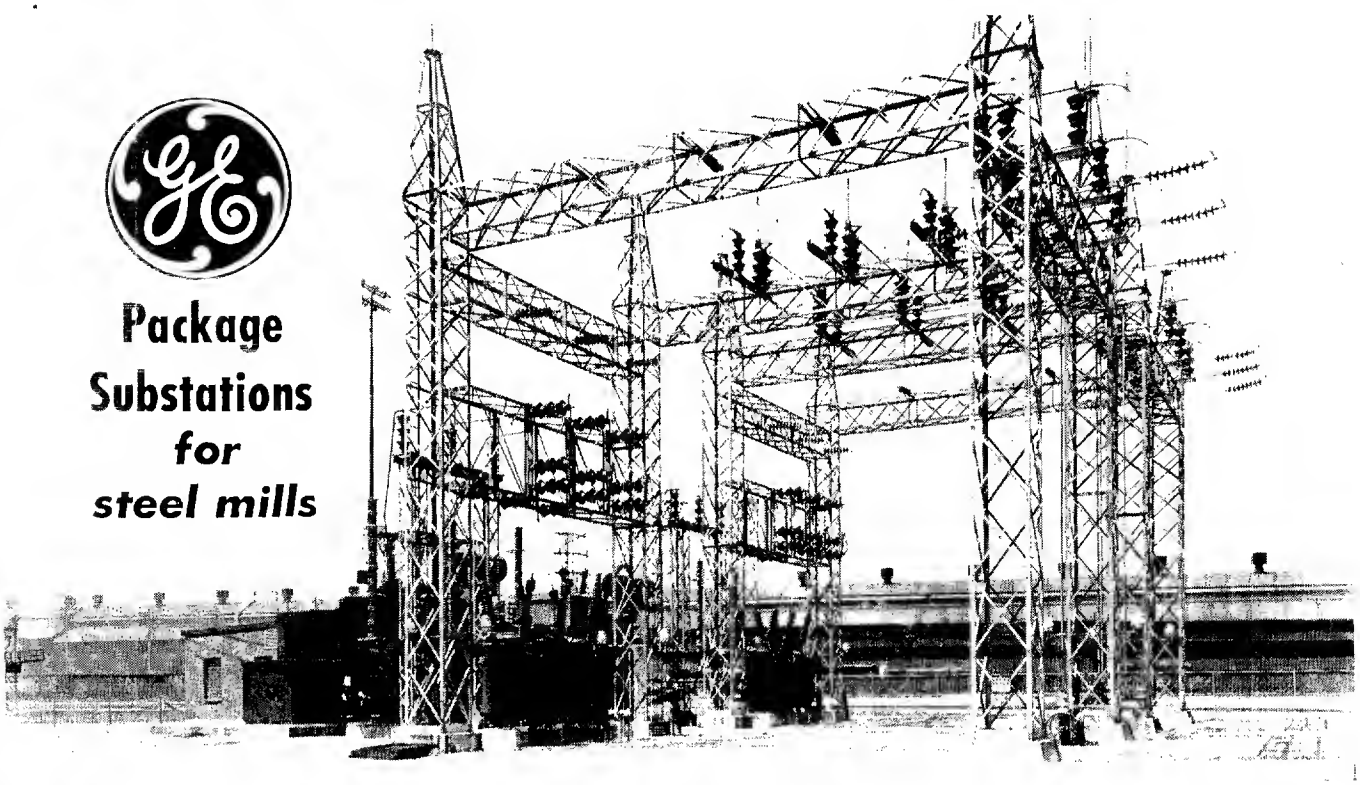
Link-Belt builds and installs equipment of proven design for handling materials in the Steel Industry along every step of the way—from raw materials to the finished product—ore, coal, stone, coke, slabs, coils (hot and cold), plates, sheets, scrap, etc. Each installation is engineered to meet specific operating conditions.

For transmitting power mechanically, Link-Belt manufactures a complete line of power transmission machinery. These rugged units provide dependable performance with maximum efficiency for driving existing or contemplated process machines.

You are invited to see equipment of the latest design in action in a Kodachrome motion picture at our booth, and to discuss your problems with our engineers in attendance.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Cleveland 15, Pittsburgh 13, Atlanta, Dallas 1, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.



Package Substations for steel mills

Installed at a large steel mill, this G-E Package Substatian contoins 115-kv primary switching structure with oil circuit breakers, two 15,000-kva transformers, and 13.8-kv metol-clad switchgear with magne-blast breakers.

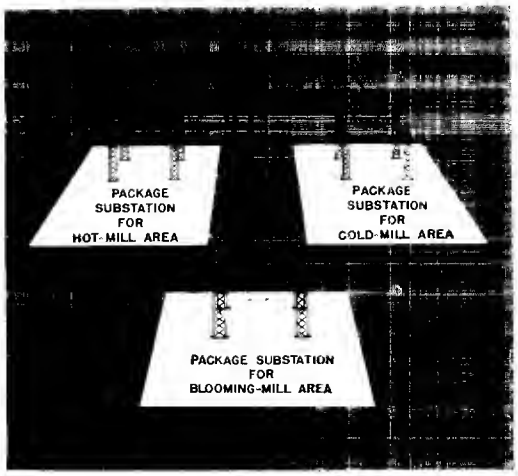
Cut system costs in high-voltage transmission

Co-ordinated G-E substations in 33-kv or 69-kv systems for large, multiple-area steel mills reduce installation costs and over-all system investment.

Here's a way to cut power distribution costs - using General Electric Package Substations for large steel mills comprising several mill areas separated by relatively long distances. It applies the well-known load-center distribution system and its advantages - reduced voltage drop, lower power losses, less low-voltage cable, and lower system costs– to the higher voltages required by steel mills.

All in one cost-saving package! A G-E Package Substation combines *all* the electric equipment needed at each step-down point - switching structure, transformers, and metal-clad switchgear. Ordered, designed, and built as a unit, this cost-saver comes complete, co-ordinated, ready to install. You save engineering time, installation expenses, and over-all system costs. For more data, call your nearest G-E office, or send for Bulletin GEA-4500. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

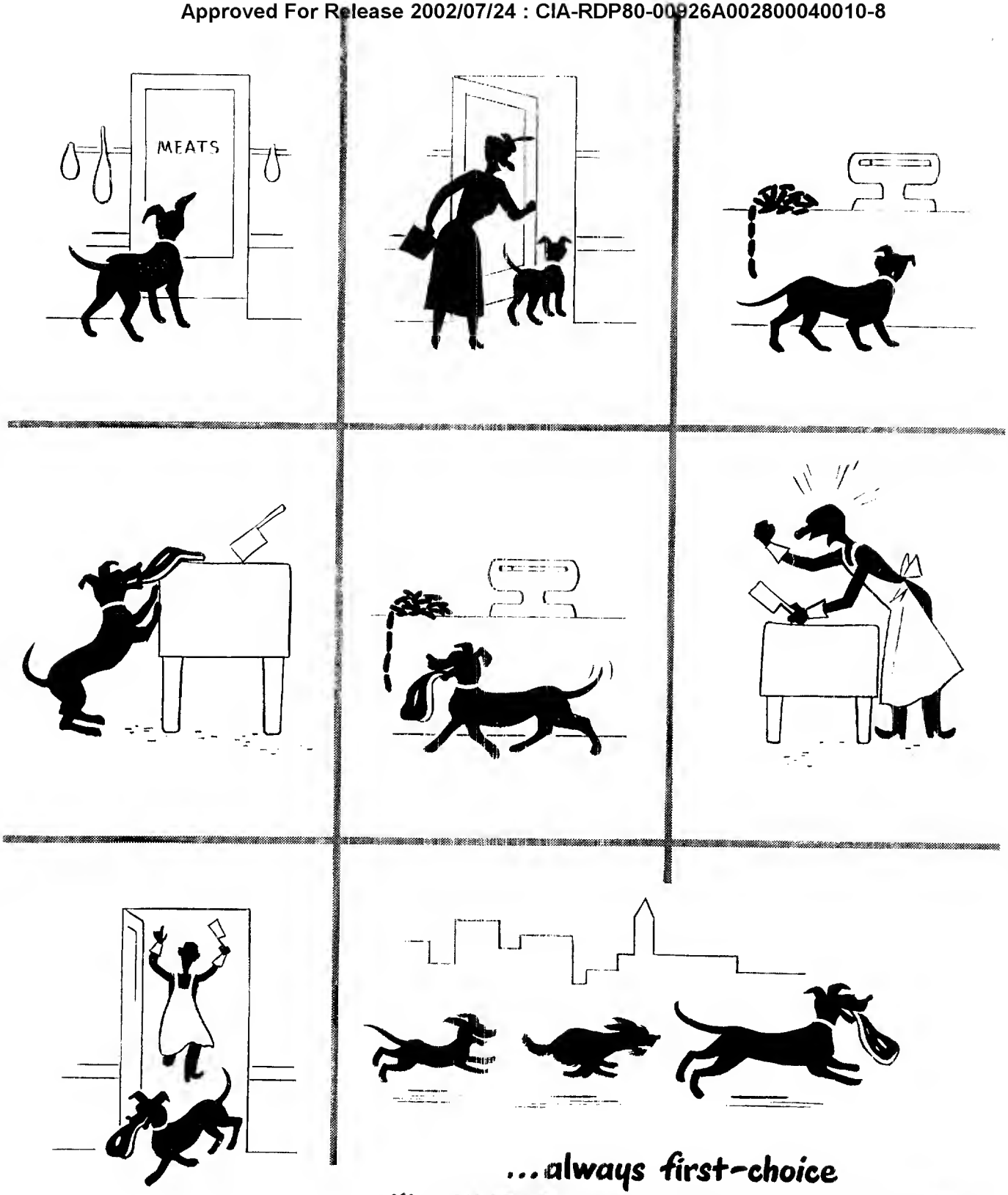
Be sure to see "Modern Industrial Power Distribution," General Electric's "More Power to America" full-color sound slidefilm. Ask your G-E representative to arrange a showing.



In high-voltage transmission, incoming utility or plant-generated power is transmitted at voltages of 33 kv or 69 kv to individual mill-load areas. Here it is stepped down at G-E Package Substations to utilization voltages, usually 6.9 or 13.8 kv.

GENERAL ELECTRIC

659-76



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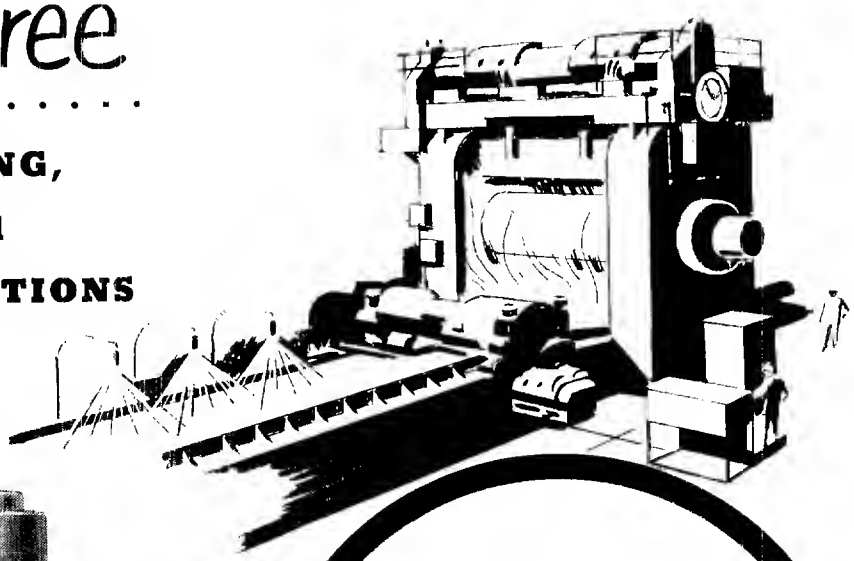
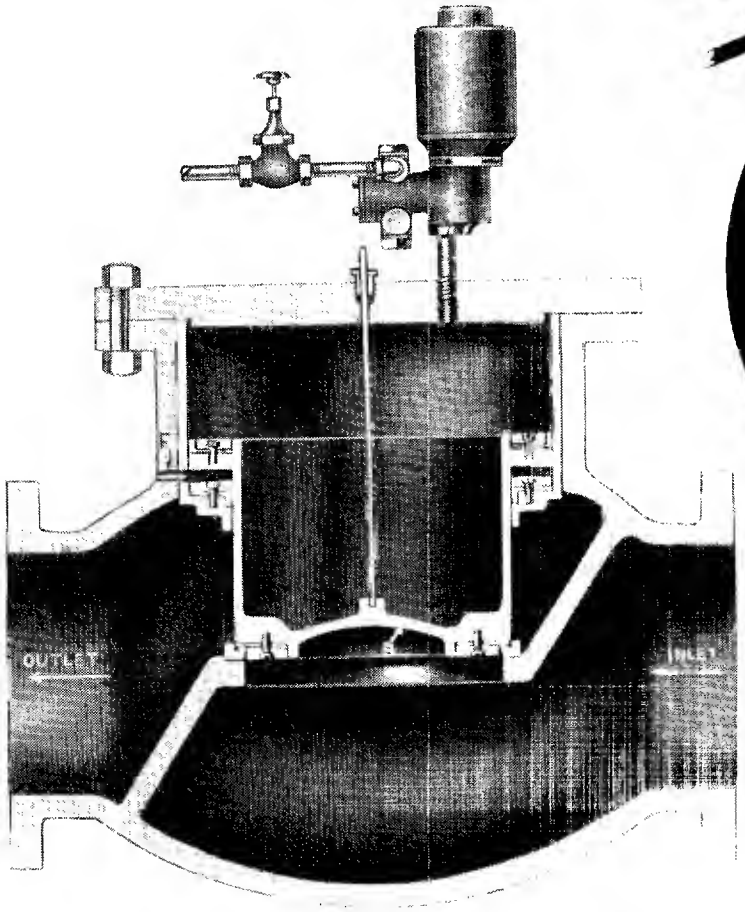
DESCALING OPERATIONS





GOLDEN-ANDERSON

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AUTOMATIC-SOLENOID

The plate mills, structural mills, strip mills, rail mills and sheet mills of America have proven the efficiency and dependability of Golden-Anderson cushioned electrically operated Water Service Valves. The air and water cushioning feature prevents hammer or shock. These automatic valves provide full pipe line area when open, are drop tight when closed, and permit adjustable closing speed.

For longer service, less maintenance and greater all-around dependability— specify and install Golden-Anderson cushioned valves.

GOLDEN ANDERSON
Valve Specialty Company

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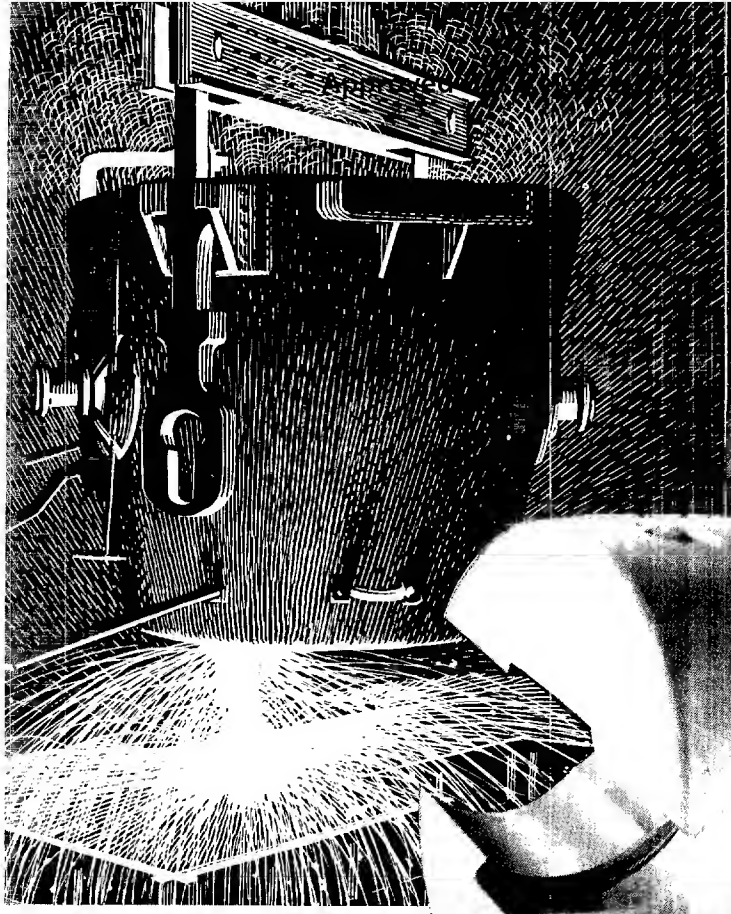
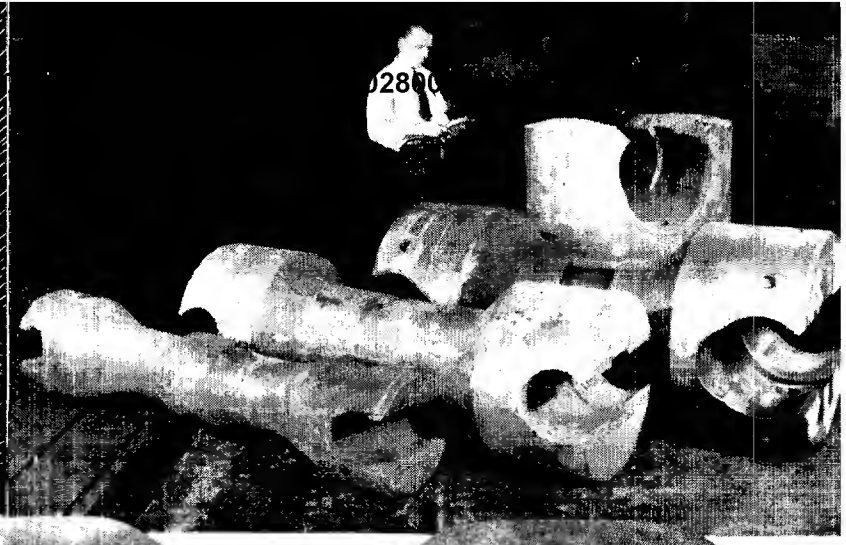
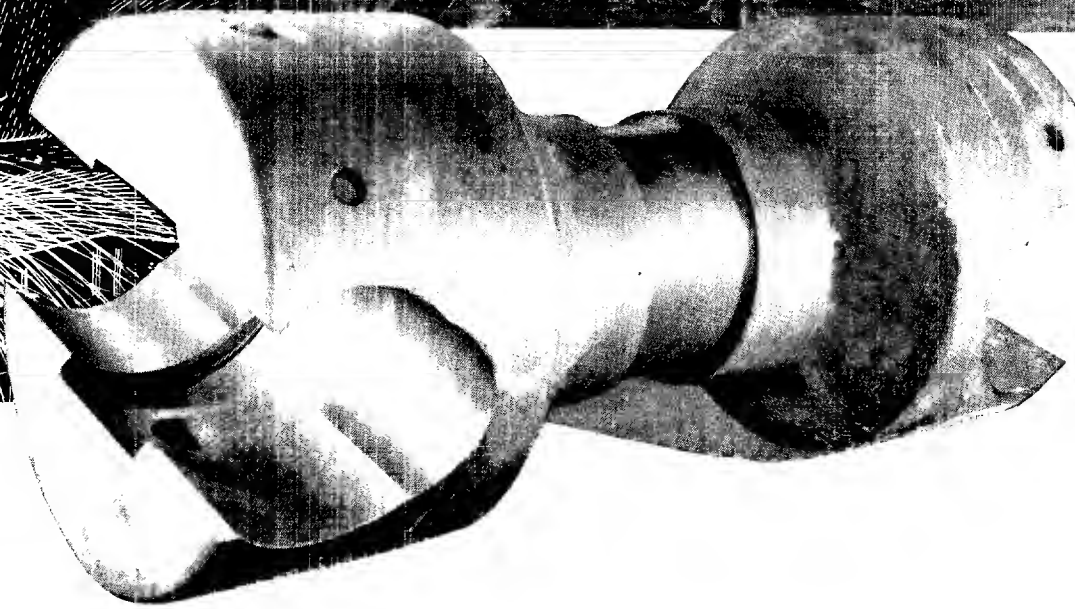


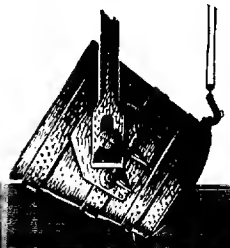




Cast UNIVERSAL COUPLINGS AND SPINDLES *give you these advantages:*

"UNION" MAKES BETTER:

CHARGING BOXES . . . PEELS
INGOT CARS
CHARGING BOX CARS
COUPLING BOXES AND SPINDLES
GEARS AND PINIONS
BLAST FURNACE BELLS
SPECIAL ALLOY CASTINGS FOR ROLLING MILL EQUIPMENT



1 Less Cost . . 2 Last Longer . . 3 Easier to Machine 4 Less Down-Time for Replacement

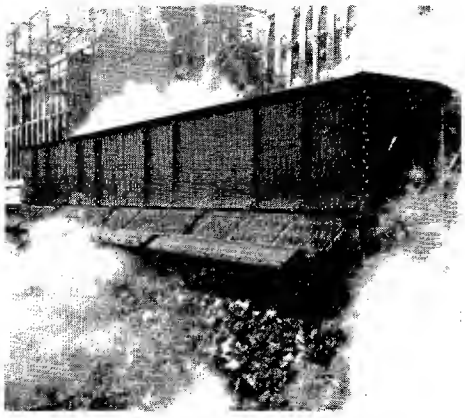
Those are not boastful claims, but the actual experience of many mill superintendents on the lookout for production economies. We welcome the opportunity to have you prove to yourself the advantages of Universal Couplings and Spindles cast from high-strength "Univan" or Armor Steel . . . Before your next replacement, let us give you the facts and figures on a "Union" casting to your exact specifications either in the rough or completely machined.

UNION STEEL CASTINGS

[illegible] 22, PA.

12 years on the toughest jobs a paving brick must do....

prove value of IRONTON NON-SPALLING FIRE CLAY PAVERS



AND HERE, where hot coke scours the wharves 263 times a day.

Have you, too, found that regular red vitrified paving brick and so-called "mill pavers" crack, spall and ultimately fail under abrasion? The poor performance of available pavers twenty years ago led The Ironton Fire Brick Co. to cooperate with by-product coke plant engineers in developing a non-spalling fire clay brick for the tops of coke oven batteries and coke wharves. Remarkable service records since have proved Ironton's pavers unexcelled for this purpose.

The Ironton Non-Spalling Fire Clay Paver is 9 x 4½ x 3", and can be laid on edge to give a 4½" wearing surface, or on the flat to give a 3" pavement. The brick is hard and dense, very resistant to abrasion and resistant to heat shock.

Wherever a floor is subject to severe abrasion and contact with hot materials, we recommend non-spalling pavers. A letter or call to Ironton will bring more information.

RELIABLE REFRACTORIES

THE IRONTON FIRE BRICK COMPANY
IRONTON, OHIO

PARALLOY

REGISTERED TRADE MARK

A name of Quality in

- PINCH ROLLS
- COILER ROLLS
- TENSION ROLLS
- STEEL MILL ROLLS

NO SCRATCHING OR GALLING

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MORE TONS PER PASS

OTHER PRODUCTS

HYDRAULIC SLAB AND BILLET PILERS
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SLITTERS—SPECIAL SHEARS AND GAUGES
TILTING TABLES—TRAVELING AND LIFTING TABLES
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STRIP STEEL COILERS AND REELS—SCRAP BALLERS
RAILROAD SPIKE FORMING MACHINES—ROLL LATHES
SHEET GALVANIZING LINES—WIRE PATENTING FRAMES
STRETCHER LEVELLERS—ANGLE AND SHAPE STRAIGHTENERS
ROLLING MILL TABLES—GEAR AND INDIVIDUAL MOTOR TYPES
MACHINERY BUILT TO CUSTOMER'S
DESIGN AND DETAIL DRAWINGS

DUCTILE CASTINGS 80,000 PSI.

The Youngstown Foundry & Machine Co.

Youngstown, Ohio

OVER SIXTY YEARS OF SERVICE TO THE STEEL INDUSTRY

Highest Quality Steels

MADE WITH

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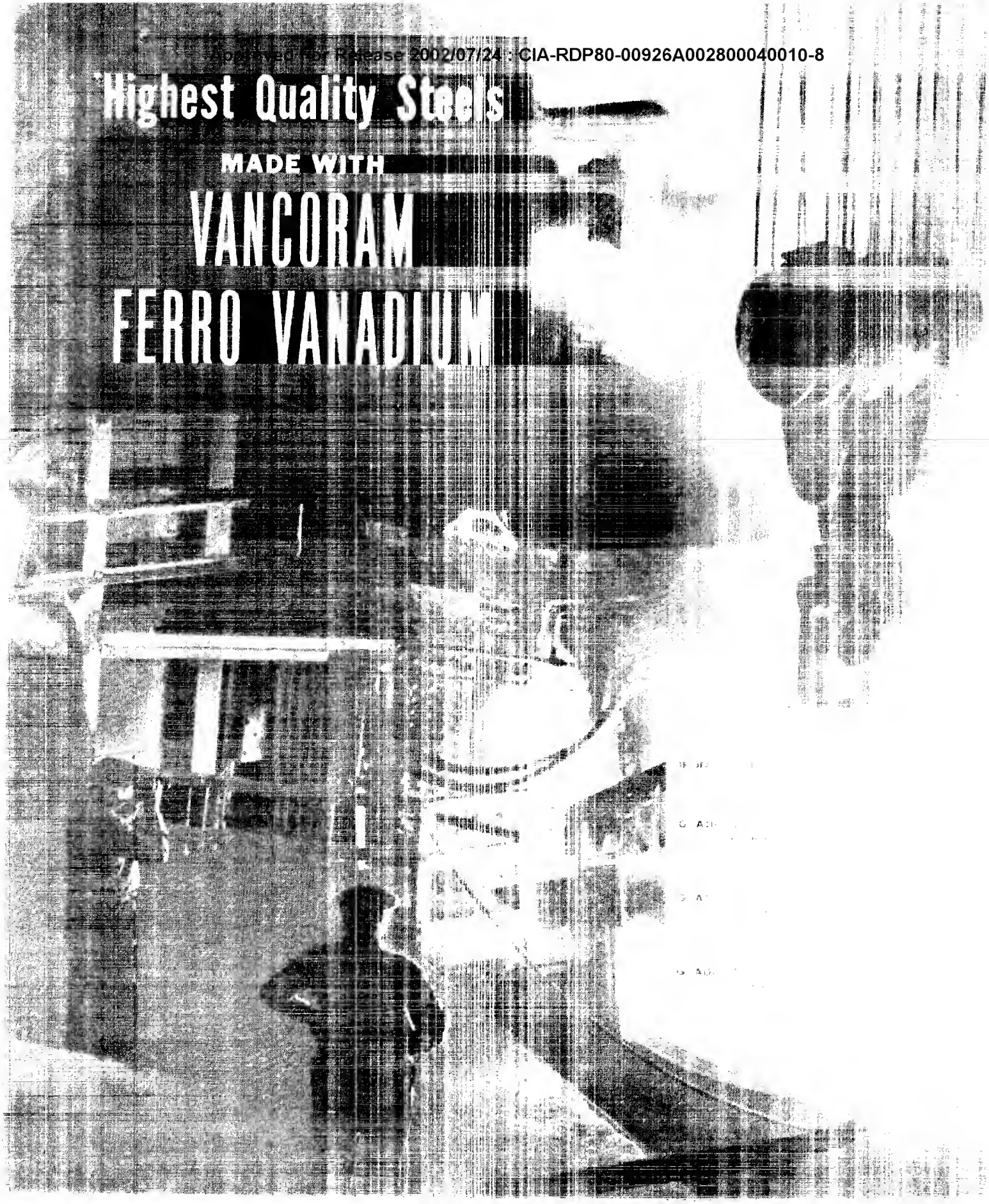
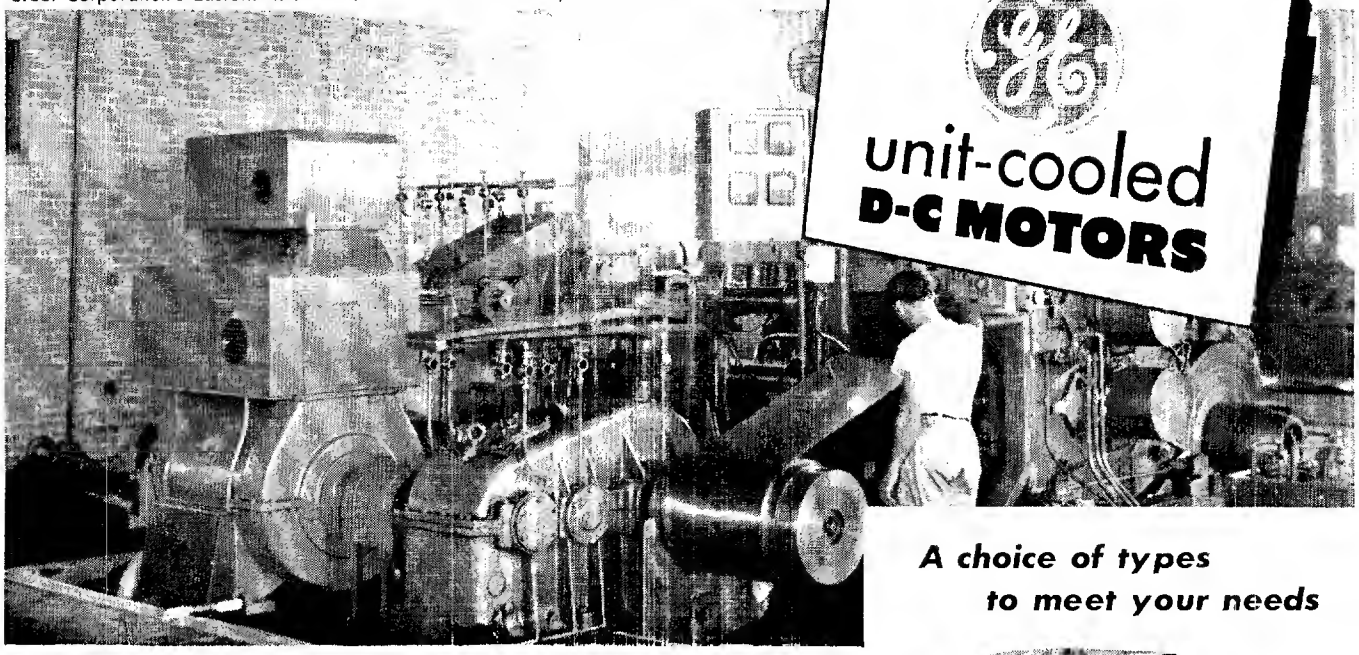


VANADIUM CORPORATION OF AMERICA

The two G-E double-blower unit-cooled d-c motors shown at left, each rated 100 hp, operate the main drive and reel on a single-stand 2-high skin-pass mill, installed at Detroit Steel Corporation's Eastern Mill Division Plant at New Haven, Connecticut.



self-protected...to cut installation costs!

In dusty, dirty or oil-laden atmospheres—where open motors can't take it without special protection—you can cut installation time and costs to a minimum with General Electric totally-enclosed unit-cooled d-c motors. Motor and unit cooler, completely factory-assembled as a unit, come to you ready to install. They need no specially-built motor room, no piping, ductwork, coolant, filters or pressurized air supply. You simplify plant layout, save extra equipment cost!

These better-protected, better-cooled G-E motors—available in ratings from 15 to 200 hp—also

. . . **minimize inspection shutdowns!** Windings, brushes and brush rigging are kept clean at all times because harmful air-borne materials can't get into the motor's internal ventilating air.

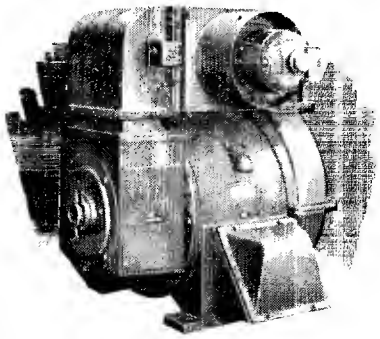
. . . **reduce power cost!** Because motor heat is rapidly dissipated, power consumption is less, especially in wide-range adjustable-speed motors.

. . . **simplify maintenance!** Large openings in the commutator end shield make it easy to get at commutator, brushes, and brush rigging.

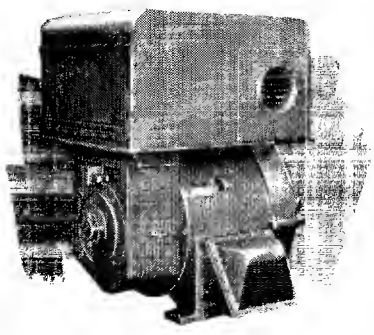
. . . **save mounting time!** Interchanging of motors to meet changing mill conditions takes less time because G-E totally-enclosed motors have the same mounting dimensions as G-E open motors of the same ratings.

Get the whole story! Ask your G-E representative how these sturdy, protected motors can help trim operating costs in *your* mill, or send for Bulletin GEA-4469. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

A choice of types to meet your needs



Tri-single-blower type—for constant and adjustable speed operation at normal speed. Unit cooler circulates internal air with a shaft-driven fan. External air is forced through alternate air passages by a separate motor-driven blower.



Tri-double-blower type—can be operated continuously without harmful overheating, even at very low speeds. A single Tri-Clad® auxiliary induction motor drives both blowers, one for internal motor air, the other for external cooling air.

GENERAL ELECTRIC

Blast Furnace and Steel Plant

Established in 1913

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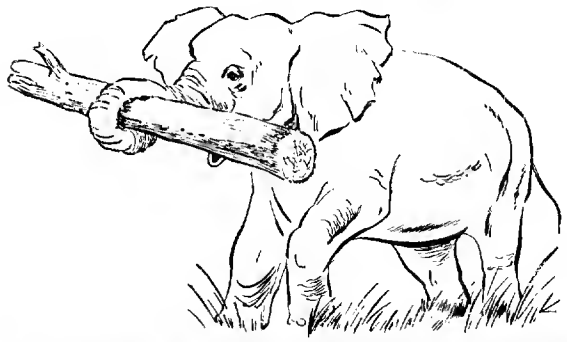
EDITORIAL CONTENTS
SEPTEMBER, 1950

Volume 38 Number 9

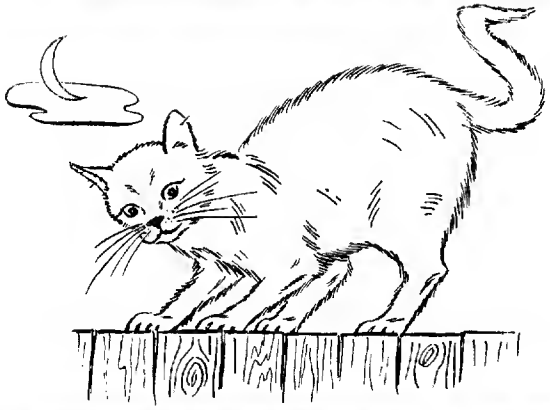
3 Good Reasons for RYERTEX Bearings

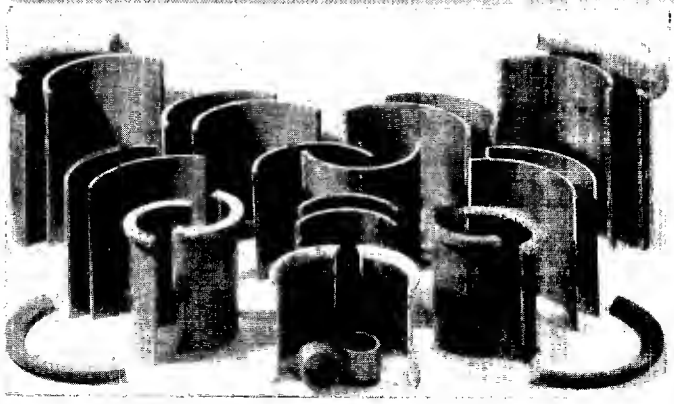
Strength enough for any steel-making bearing job—and plenty to spare—that's what you get when you specify Ryertex bearings. This tough plastic and fabric composition easily sustains a crushing strain of 30,000 lbs. per square inch, far more than encountered in steel mill bearing applications. And elastic characteristics enable Ryertex to cushion severe shock loads without deforming.



Low friction, with water lubrication only — is another reason why Ryertex bearings are used in every step of steel making from slabbing to finishing mills. Roll necks turn on Ryertex as smoothly as a seal slips through the sea. And a little of that same sea, minus salt, of course, is the only lubrication Ryertex needs. The result: lower operating costs and cleaner, safer operating conditions. Oil or grease can also be used to lubricate Ryertex.

Long wearing Ryertex bearings seem to have as many lives as the mill cat. They last and last, normally many times the life of metal bearings and sometimes as much as twenty times longer. Because of their polishing action on the roll neck, Ryertex bearings actually become more efficient with use. A Ryertex sales engineer will gladly work with you on any bearing application. We suggest you write today for further information.





A typical group of Ryertex bearing liners. Ryertex can be molded to meet your specifications for bearings of any shape or size.

JOSEPH T. RYERSON & SON, INC.
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RYERSON-RYERTEX

Blast Furnace and Steel Plant

SEPTEMBER, 1950

VOL. 38 No. 9

Let's Have Cooperation

THE paramount concern of everyone in this country today is in regard to the Korean situation, and as to whether the conflict is going to be confined to Korea alone.

Whatever may result, there remains only one course, and that is to face the situation realistically and prepare to finish the task as speedily as possible. How to do this most effectively is of the utmost importance since well considered planning can shorten the length of the conflict considerably.

In any planning consideration must be given to the facilities with which the armed forces will be equipped, and these will, of course, be dependent upon an adequate supply and distribution of steel. Fortunately for the country, there never was a period in its history when steel could be obtained in as great quantities as at present. Thus, there need be no cause for concern as to the ability of the steelmakers to respond to whatever emergency may arise.

There is some concern among steel men, however, as to what steps the government may take, should the necessity arise, as to the extent of control that will be exercised over the distribution of steel beyond voluntary allocation. The economic interests of this country are to a large degree dependent upon the balance in which steel is distributed to consumers in peace, or war.

Should this balance be disturbed by full allocation, the entire system of distribution by individual companies will have to be rearranged. If this rearrangement is necessary, the men of the steel industry should receive more consideration in making the switch than they did when changing from a war to a peacetime basis in 1945. Unfortunately the scrapping of the "basing point" system disrupted a well organized procedure, that was eminently successful for both producer and consumer, and that should be in operation today. It is to be hoped that voluntary allocation will be maintained.

The Morgan-Isley System or Conventional Natural Draft?

Which will recover the most heat?

Which will save the most fuel?

Which has no leaky reversing valves?

Which produces unlimited draft—regulated with extreme accuracy?

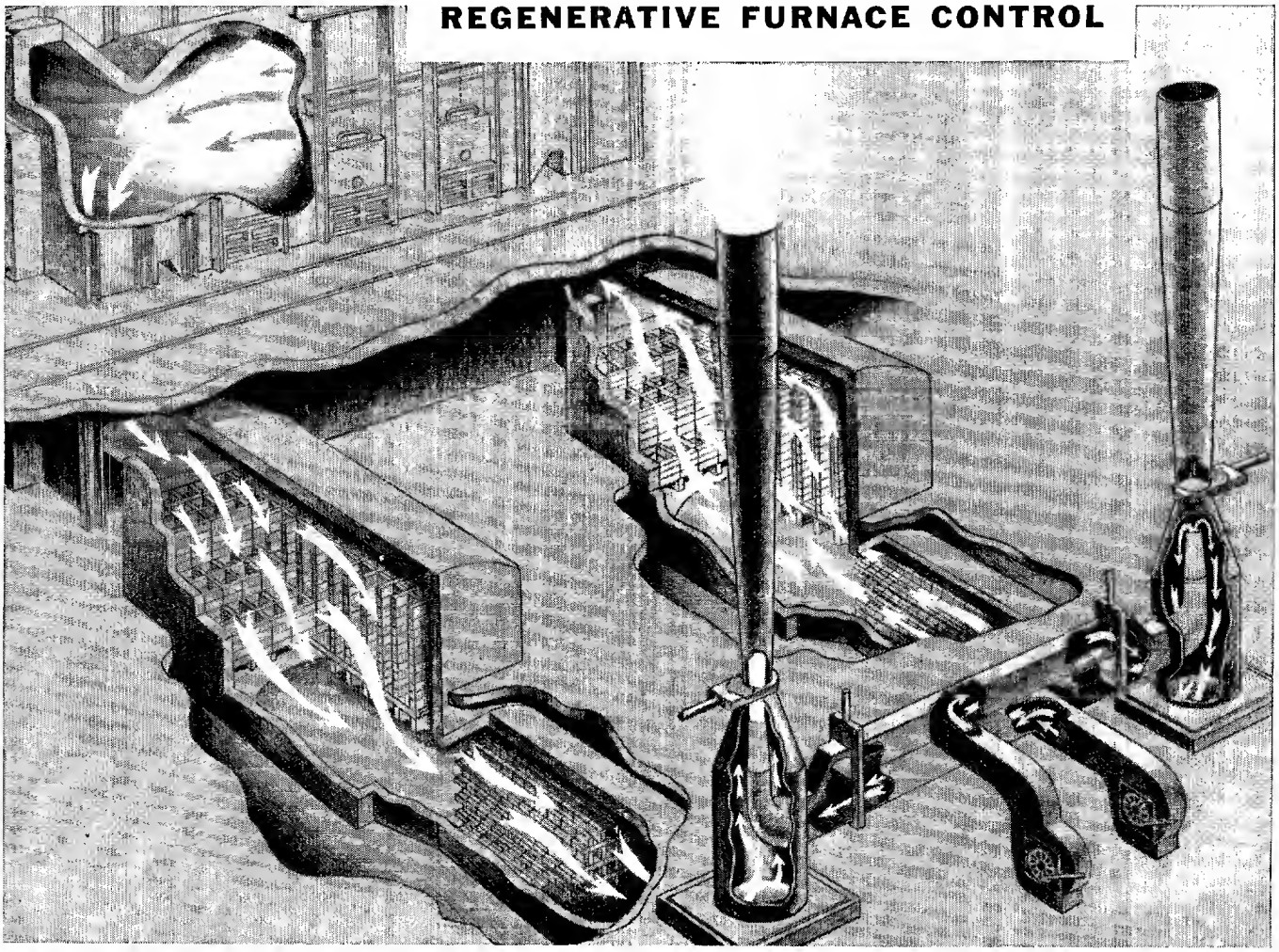
Which costs less to buy and erect—a Morgan-Isley System or water-cooled reversing valves, dampers and a natural draft stack?

The Morgan-Isley System is the answer to these and your other questions regarding combustion control.

Let us explain more fully.

MORGAN-ISLEY

REGENERATIVE FURNACE CONTROL



Morgan Construction Company

WORCESTER, MASSACHUSETTS

PITTSBURGH, PA., 2815 Koppers Building

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CCC-25

Doughnut-type rotary hearth billet heating furnace for No. 2 seamless mill.

Seamless Tubes Now Produced at Modernized Gary Works

SPECIALITY steel tubing, both seamless and welded, ranging in sizes from ½ inch to 9 inches O. D. can now be produced at the revamped and modernized Gary Works of National Tube Company, a United States Steel subsidiary. Most unusual of the new equipment is the No. 3 seamless mill, a push-button installation that can shunt pierced shells from the piercing mill in any one of three separate directions, depending on the type of tubing to be rolled.

This mill, an entirely new development, features continuous rolling on a mandrel and incorporates the stretch-reducing process in twelve separately powered stands. Stretch-reduction is accomplished by speeding up each successive roll stand, the added speed from one stand to the next stretching the tube between them. The tension acts along the length of the tube and reduces its wall thickness. This method is especially suited to the manufacture of small diameter tubing in long lengths. Delivery speeds run from 850 to 1,700 feet a minute.

A 160-foot cooling table of the rotating screw roller type oscillates the stretched and reduced tubes back and forth across the rollers approximately 6 feet. It is designed to insure delivery of straight tubes to the cold saw.

Three electric-weld tube mills built to National Tube Company specifications are also part of the new installation, making possible the production of welded carbon steel tubes from ½ inch to 5 inches O. D.

For the manufacture of stainless steel tubular products, a special unit incorporates extensive equipment of the most modern design. All processing installations in the stainless steel unit have been selected for closeness of control and for the production of a high quality product.

In addition to the new facilities, much of the original equipment has been modernized to meet the exacting demands of today's market. The No. 2 seamless mill, which was installed in 1930, has been rebuilt to manufacture alloy specialty goods up to 48 feet long in sizes ranging from 3½ inches to 9 inches O. D. Among the major improvements made on this mill was the installation of a 60-foot doughnut-type rotary furnace with 50 tons an hour capacity.

An automatic outlet-guide section trough for the No. 1 piercing mill is a new development providing automatic hydraulically controlled guiding of the mandrel bar and pierced shell. Water-cooled rollers installed on the ingoing side of the reheating furnace, ahead of the plug mill, is an unusual feature of this otherwise conventional roll-down furnace. Ahead of the continuous sizing mill is a 13-chamber in-line reheating furnace with complete automatic controls. These chambers are in a continuous line and grouped to provide six separate heating zones, each individually controlled by an electric eye.

A completely modern metallurgical laboratory has been provided in a centrally located building which has been remodeled and air conditioned. In addition

to standard equipment for determining the mechanical and physical properties of tubular products, a laboratory for analysis by the spectrographic method has also been installed.

To complete the modernization of the Gary Works it was necessary to rearrange and reorganize many of the auxiliary departments. General facilities and auxiliary equipment had to be expanded and a new sanitary sewer system built. Transmission lines were constructed for 60-cycle power to supplement the existing 25-cycle system.

No. 3 Seamless Mill and Facilities

The No. 3 seamless mill is an automatic continuous seamless and Assel combination mill producing tubes in hot-rolled lengths of 45 feet in light-wall tubing and 25 feet in heavy-wall tubing. Sizes range from 1 inch to 3½ inches O.D.

There are two separate continuous lines of in-line heating chambers. The application of these chambers in a continuous line for heating rounds is new to industry. This is the first installation of its kind ever made. Each consists of 27 chambers, 19 chambers being used to bring the cold rounds up to the desired temperature and eight to hold or soak them to insure even heating.

The 27 chambers in each line are grouped into six separately controlled zones, either gas or oil fired. Tube rounds are charged cold at predetermined lengths and are cut to the required piercing mill sizes by hot saws at the end of each furnace line. The tube billets then enter the piercing mill, which is of the conventional Mannesmann type with the usual inlet and outlet troughs.

From this point the path of the pierced shell is determined by the type of tubing to be rolled. For small-diameter light-wall tubing, a mandrel bar is inserted and both mandrel and tube pass through the 8-stand continuous rolling mill. The bar is then removed and returned for the next tube while the rolled tube passes through the reheating furnace and on through the 12-stand reducing stretch mill.

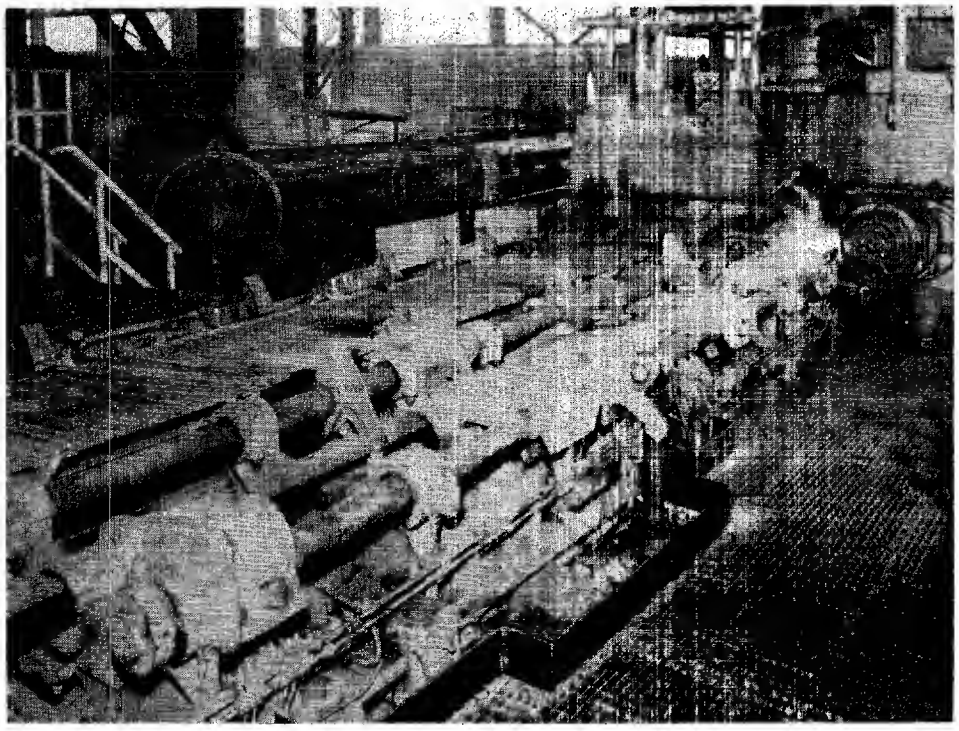
The reheating furnace is a roll-down type with inlet and outlet water-cooled rollers. The furnace is 48 feet long inside with 3-zone control, equipped with furnace pressure, temperature and fuel controls.

Like the mandrel mill, the stretch-reducing mill is arranged with its successive stands located at right angles to each other, with each pair of rolls inclined 45 degrees to the floor level. The rolls of each stand have semi-circular grooves which alternately engage one side and then the other of the shell's circumference. By producing a speed differential between the successive roll stands, tension is produced in the portion of the tube between the stands. This tension stretches the tube and creates a thinner wall and greater length. In this way the stands are rolling the tube continuously thinner while also reducing its diameter.

After leaving the stretch mill the finished tube passes across a cooling table to a multiple cold saw where it is cut into lengths as required. It then moves to the scales for weighing.

When rolling heavy-wall tubing, after leaving the piercing mill the pierced shell by-passes the 8-stand mandrel mill and passes directly through the Assel mill. The mandrel bar is then removed and the tube passes on through the reheating furnace to the 12-stand sizing sinking mill. This mill is conventional with a common motor operating the gear-reduction drives and the line shaft. Again the tube passes to the cooling table and through the multiple saw to the scales for weighing.

When rolling large-diameter light-wall tubing, the shell is passed through the 8-stand continuous rolling mill but the Assel mill is by-passed. The tube is then reheated and passes through the 12-stand sizing



Delivery side of piercing mill for No. 3 seamless tube mill.

sinking mill and through the rotary sizer. The latter is conventional, with the rolls set at an inclined axis. From this mill the sized tube moves to the cooling table, through the multiple cold saw and on to the scales.

The cooling table is 160 feet long and of a rotating screw-roller type. As the tubes are carried across, they oscillate back and forth across the rollers approximately 6 feet.

Electric Welded Tube Facilities

The new electric-weld tube mills were designed to National Tube Company specifications to produce tubes from ½ inch to 5 inches O.D. There are three, a 2-inch, a 3-inch and a 5-inch, each consisting of a forming section, a welding section with a rotary transformer to supply the welding heat, a sizing section for sizing and rounding the tube to specified tolerances, and a rotary-head traveling cut-off. The welding transformers are oil-cooled and are rated at 150 kva, 250 kva and 500 kva, respectively. Each one is supplied from its own generator with 180-cycle current.

Material for the electric-weld mills is provided from wide-band coils slitted to strip of proper size. Storage space is provided for stocking approximately 3,000 tons of 36-inch-wide coils of about 14,000 pounds each. This material may be either hot-finished, pickled and oiled or cold-rolled rimmed or killed steel, according to trade requirements. Additional space is provided for stocking single-width strip which has been rolled as required for the tube welders. A complete slitting line, built to National Tube Company specifications, was installed to handle all strip for the three welders. It is a combination drive and pull-through type slitter capable of preparing material up to 8 BWG (.165 inches) by 36 inches wide. Handling facilities consist of a coil-loading ramp, an elevating-type charging buggy, a pay-off reel, recoiler, unloading buggy, banding stalls and scrap winder. Proper strip tension between the slitter and the recoiler is automatically maintained by electric controls.

To permit continuous operation of the 2-inch and 3-inch mills, looping and splicing equipment is provided. This equipment includes two splicers, each provided with a hydraulically operated up-cut shear with a clamping arrangement which automatically double shears the strip ends and clamps the squared ends into position for gas welding. The loopers, which were designed and built at Gary Works, accumulate 300 feet of metal which is paid out to the welders while the strip ends are clamped and welded. Coils charged to the 5-inch mill are rethreaded without end-welding.

Tubes from the electric-weld mills are transferred to the finish floor where rotary straighteners bring them to commercial tolerances. Following this operation they are cut to specified lengths on rotary-head cut-off machines. After passing through a battery of profilers, which end-face and chamfer the O.D. and I.D., the tubes are inspected and packed for shipping.

Stainless Tube Facilities

Because of the exacting performance required of the finished product, an extensive installation for handling and processing stainless tubular products

Tube leaving reheating furnace and entering 12-stand stretch reducing mill.

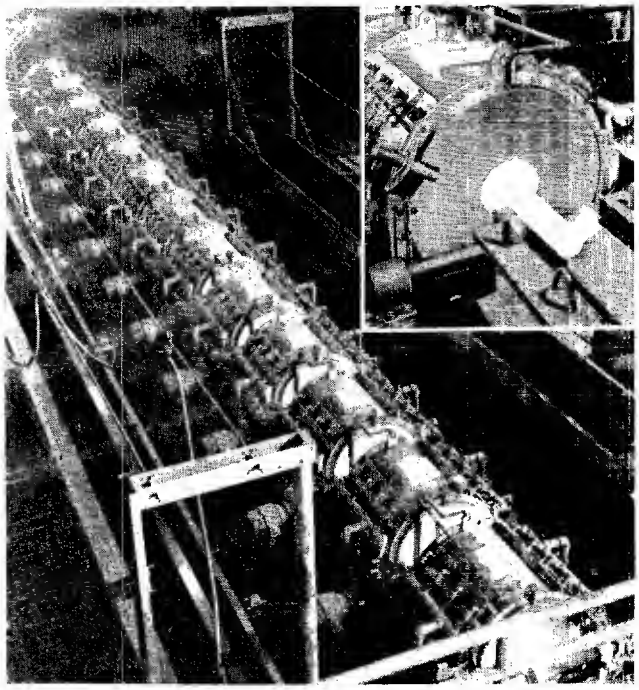
was installed at the Gary Works. The stainless production unit occupies a main building 160 feet wide and 744 feet long equipped with facilities of the most modern design. For proper conditioning of the seamless hot-rolled tube prior to cold working, a unit of three abrasive wet-grinding machines is employed to remove surface defects. For further refining the surface, a battery of polishing machines using abrasive cloth belts of various grits is employed.

Numerous portable devices are available for the conditioning of small sections of the internal or external surfaces of the hot-rolled hollow billets. Boring equipment is provided for a thorough conditioning of the entire internal surface.

In a 60 x 80-foot room is located a separate pickling unit provided for "in process" material. The pickler consists of five vats—two steel water rinse tanks, two acid tanks and a salt bath for descaling. The descaling unit is a molten salt bath held at 950 degrees which, in combination with a water quench, will remove all evidence of scale without attacking the metal. After the salt bath the tube is dipped in two acid solutions, followed by a hot-water rinse. Each lift of tubing is handled by an overhead crane controlled from a glass-enclosed room centrally located outside the pickling room.

Located beyond the main pickling room, a group of four tanks is available for cleaning and lubricating purposes. Here each load of tubing is cleansed prior to annealing to insure a clean product.

Three types of annealing equipment are used to process the wide range of sizes and grades of tubing manufactured. A gas-fired, three-unit, doughnut-type continuous furnace anneals tubing within the range of 3 to 8⅝ inches O.D. This furnace has a rated capacity of 1,500 to 3,000 pounds an hour, depending on size and wall thickness of the tube. Product below 3 inches O. D. is annealed in a continuous furnace heated by gas-fired radiant tubes. This furnace, 30 inches wide and 15 feet long, is equipped with water-cooled silicon carbide rolls. It has a rated capacity of 1,000 pounds an hour. For small light tubing from



One of the reheating furnaces for No. 2 seamless tube mill.

¼ inch to 3 inches O.D. an electric induction annealing furnace is employed. It has a rated capacity of 500 pounds an hour.

Each of these furnaces can develop temperatures up to 2,150 degrees. Sighted on the tube are ravotubes which record and control the tube temperature as it passes from the heating chamber to the water quench at the outlet. Each furnace is equipped with variable-speed conveyors to insure proper treatment of any size processed.

Stainless tubing 3 inches O.D. and under is reduced in another department which is equipped with two 3½-inch tube reducers, three 2½-inch tube reducers and five 1½-inch tube reducers. Cold-drawing equipment in the stainless department consists of two 50,000-pound and one 150,000-pound drawbenches. One of the former is equipped with a reeling device to permit the drawing of stainless products over a bar. To cover the range of point sizes required in the cold-drawing operation there is one ¾-inch and one 2-inch rotary swager and one 800-pound hammer.

A complete complement of finishing equipment is available. This includes a 12-roll straightening machine with a capacity up to 2 inches O.D., a gag press straightener for 2-inch to 4½-inch tubing, one two-roll straightener with a capacity up to ¾ inches O. D., and one five-roll straightener with a capacity up to 4½ inches O.D. There are also two units of two cut-off machines each, complete with conveyors. One has a capacity of 2 inches O.D. and the other of 6 inches O.D. Each unit is equipped with adequate stops to permit accurate cutting to the most exacting dimensions.

Testing equipment consists of a coupon press with plugs, pins and gages to perform the manipulations required of each specification. One hydrostatic tester for tubing up to 4½ inches O.D. is provided for pressure testing. This equipment can exert pressures up to 3,000 pounds a square inch. Tubing above 4½ inches O. D. is sent to an adjoining unit where the straightening, cutting and hydrostatic testing is performed.

Final pickling, or "passivating", is performed in a unit of two pickling tanks and a water rinse. This unit is equipped with an individual crane operated from a floor position at the extreme end of the pickling tanks. The crane has two hooks, each individually controlled. This arrangement permits lifts of tubing to be elevated at various angles, facilitating complete drainage. After a final rinse, the tubing is blown out with live steam and air. There are four internal belt-polishers, and additional external polishing equipment to produce surfaces in the grit requirements of the customer.

In addition to frequent spot checks throughout the manufacturing process, the finished product must undergo final inspection. For this purpose two inspection and packing tables are located near the pickling room.

No. 2 Seamless Mill and Facilities

The most important of the original equipment to be renovated under the modernization program at National Tube Company's Gary Works was the No. 2 Seamless Mill. Originally built in 1930 to manufacture pipe and casing in lengths up to 48 feet, the mill was shortened to 35 feet during World War II to permit installation of additional machinery and reheating furnaces for alloy specialty goods. Under the post-war program the mill was again changed to manufacture alloy specialty goods up to 48 feet long in sizes ranging from 3½ to 9 inches O.D. This alteration necessitated the removal of reheating furnaces and relocation and redesign of other pieces of equipment.

Among the major items of new equipment are a 60-foot doughnut-type rotary furnace of 50 tons-an-hour capacity, an automatic outlet-guide section trough for the No. 1 piercing mill, a reheating furnace ahead of the plug mill and a 13-chamber in-line reheating furnace ahead of the continuous sizing mill.

The rotary furnace is designed to incorporate five individual walled zones, each with its own separate furnace controls and equipped to burn oil or gas, or oil and gas in combination. A machine automatically feeds cold rounds as required onto a conveyor. The conveyor, in turn, is automatically activated from the discharge end of the furnace by the manually operated discharging machine.

Two finishing floors handle the full range of seamless products manufactured on the No. 2 and No. 3 mills. No. 1 floor is located near No. 3 seamless mill and processes both hot-rolled and cold-drawing tubing from 3/16 to 3½ inches O.D. No. 2 floor is located near No. 2 seamless mill and can handle tubing of 3½ to 9 inches O.D. Both floors are equipped with straightening machines of various types, cut-off machines, hydrostatic testers, pipe-coating equipment and ables for inspection and packaging.

Processing Department

Tubing other than hot-rolled requiring further treatment, such as pickling, doping, cold-tube reducing, cold-drawing, pointing, normalizing, intermediate and final annealing, is processed in this department. The furnaces are of the continuous roller-hearth type for normalizing and bright annealing and of the convection type for imparting structure and tensile properties.

The cold-working division consists of drawbenches of 20,000 to 300,000 pound capacities and tube reducers handling tubing of 1½ to 3½ inches O.D. The 20,000-pound, high-speed multiple drawbench is new. Other changes consist principally of streamlining the handling of material by relocating the necessary equipment.

Metallurgical Laboratory

To keep pace with the new and renovated equipment, a centrally located metallurgical laboratory was begun in 1948 and completed in the spring of 1949. The building is completely air-conditioned for both summer and winter to provide the clean atmosphere for precision equipment and for comfort of the employees.

In addition to tensile, hardness, torsion, impact, magnetic and metallographic facilities for determining the mechanical and structural properties of tubular products, a complete laboratory for analysis by spectrograph has been installed. This equipment makes possible a more complete analysis in less time than by conventional methods.

Power used throughout the original Gary Tube Mill was 25-cycle. All new equipment purchased was 60-cycle, so new power lines were needed throughout the plant wherever new equipment was installed. This necessitated the construction of 2,600 lineal feet of concrete ducts, requiring 910 cubic yards of concrete, and the installation of 10 miles of 4-inch fiber duct and 10 miles of lead-covered cable. A total of 270 miles of wire was used and 65 miles of conduit laid. To supplement the plant's compressed air capacity, two 2,700 cubic foot, 100-pound air compressors were added.

Coal Storage System for Weirton Steel

Weirton Steel Company has awarded Koppers Company, Inc., a contract for the construction of a coal storage and reclaiming system at its Weirton, W. Va. coke plant, Joseph Becker, Vice President and General Manager of Koppers Engineering and Construction Division, has announced.

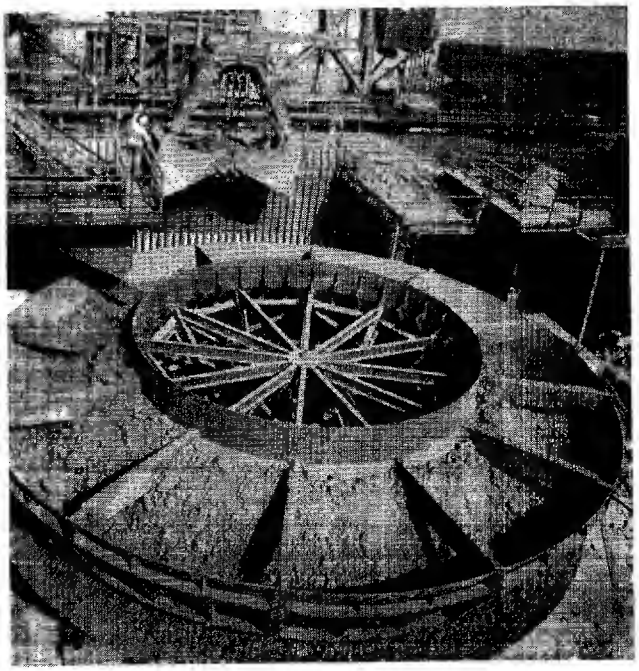
This coal storage system will consist of additional equipment and alterations to existing equipment, which will enable Weirton Steel Company to handle 500 tons of coal per hour into the coal storage area, with a similar capacity when reclaiming coal for use in the coke ovens. The system will allow about 250,000 tons of coal to be stored on the site, and is scheduled for completion before May 1, 1951.

Included in the contract will be a new 600-ton capacity balance bin for receiving coal from the barge unloader on the Ohio River, a 60-ton capacity diesel-electric transfer car to deliver coal from balance bin to storage area, and an electrically operated traveling tower with grab bucket which will be used with bulldozers to store and reclaim coal. The runway for the traveling tower will be about 565 ft. long.

A reclaiming hopper will be built into this traveling tower to load the transfer car which will return the storage coal to a new track hopper, from which it will be fed into the existing coal handling system at the ovens. The new system also will be arranged to permit coal to be dumped directly from railroad cars into the storage area.

Sintering Plant Started at Edgar Thomson Works

U. S. Steel's recently announced program to enlarge the steel capacity of its Carnegie-Illinois mills by 1,660,000 tons annually gained momentum recently when a new sintering plant started operating at Edgar Thomson Works in Braddock.



Sinter breaks into smaller chunks as it slides off conveyor into circular hopper via chute at left. One trip around hopper cools sinter enough for storage in pit at rear of hopper.

The new facility, using heat to agglomerate iron-bearing flue dust and ore fines, will recover over 400,000 tons of high grade ore annually for the blast furnaces of this Carnegie-Illinois plant. As a result, ore supplies will be conserved and pig iron production increased.

The plant has a rotary cooler in which the sinter is air-cooled instead of water-cooled, resulting in better quality of product.

The productive capacity of U. S. Steel's Pittsburgh district mills will mark another advance this fall with completion of a sintering plant at Homestead District Works. The remainder of the program, which involves numerous improvements of existing facilities, is scheduled for completion within a year—about half the time required for installation of entirely new facilities.

De-dusting the Bessemer Converter

by W. Trinks
Associated Engineers, Pittsburgh, Pa.

FIFTY years ago, smoking stacks were considered to be a sign of prosperity. Today, smoke is called a public nuisance. The situation has changed so much that cities, townships, and counties are now united in the slogan: "We want water that is fit to drink and air that is fit to breathe."

While much progress has been made in eliminating (or, at least, greatly reducing) coal smoke, less progress has been made with eliminating fly ash from power plants, and red smoke from open-hearth furnaces; and practically no progress has been made with taming the Bessemer converter, so far as elimination of brown smoke is concerned.

It is the purpose of the present article to point out the difficulties which are in the road of "de-dusting" the Bessemer converter. By comparison, eliminating the smoke which comes from open-hearth furnaces is easy. The gases in open-hearth stacks have a temperature of 1000 to 1200 F. If they have passed through waste heat boilers, the temperature is much lower. Since the gases must pass up in the stack, they are confined and their motion is constrained. The gases which leave the Bessemer converter have a temperature of about 3000 F., and they are still burning after they have left the mouth of the converter vessel. These flaming gases are not confined and cannot be confined, for several reasons. The mouth of the converter is not stationary during the blow. The vessel is tilted from horizontal to vertical position at the beginning of the blow, and is laid down again before the end of the blow. And that is not all. During the main part of the blow, the position of the converter is not always the same. The blowers have a surprisingly keen ability to locate thin spots in the bottom. They tilt the vessel in such a manner that the depth of iron or steel is greater over the thin spot than elsewhere.

Additional features exist which make any dust-catching device near the converter mouth an impossibility. A crane-way must be provided over the converter for transporting ladles which contain up to 50 tons of iron or steel. Converter vessels are removed for relining, and repair jobs must be done.

Last, not least, the converter spits pellets of iron and steel. The yield of a converter is commonly considered to be in the neighborhood of 88 per cent. For every 100 pounds charged into the vessel, about four pounds of carbon burn to CO in the converter and to CO_2 after leaving the vessel. Eight pounds are thrown out as pellets or as metalic oxides. The pellets are troublesome, because they are shot out with high velocity. Some rise to a height of 50 or even 60 feet. When impinging upon a solid object such as a wall or girder, or roof, the pellets flatten and stick. The action is very similar to that of the metal-spray. In time, heavy masses of iron and steel are formed. Unless removed at regular intervals, they drop off and endanger those who are working below.

The combination of all of these facts makes the problem of dedusting the Bessemer converter an extremely difficult one. The most obvious, but very expensive solution consists in total enclosure, with a roof at least 70 feet above ground level. At that height very few pellets can stick to the roof. The fan which draws the gases from the converter chamber must suck in enough volume of cold air to reduce the temperature of the gases to about 800 F., in order to prevent scaling. The diluting air may be drawn in from outside for instance through louvres. The cooled gases can be sent into cyclone cleaners or other known dust-separators.

The gases which have passed through dry separators are not entirely free from smoke. The hot gases contain fumes which solidify upon being cooled in the open. If that portion of the total smoke is likewise to be eliminated, the gases must be sent through a spray tower and then through an electrostatic precipitator. The cooling water removes some of the dust and must, according to the latest laws, be filtered, before it is allowed to re-enter the river or the lake.

A complete total-enclosure installation for several converters runs into fabulous sums. So far as the author knows, complete enclosure for the purpose of dust elimination has never been attempted in a steel plant. During the last war, small sideblown converters at Ford's River Rouge plant discharged through vents into a large hall, where the gases were sprayed with water. The resulting mud was gathered in V shaped buggies. The sides of the V were made of narrow-mesh wire screen, which permitted the excess water to drain off. It must be mentioned here that the side blown converter lends itself to dust-catching much better than the bottom blown converter.

Complete enclosure was observed by the author in Germany, where it had been installed as a war measure for the purpose of blacking out the light which converters emit. Much of the converter dust was deposited in the flame tower and was removed at regular intervals through a door in the funnel-shaped bottom. Only a light brown haze was visible at the top of the tower.

In eastern France and in western Germany, most of the converter gases pass up through an elbow-shaped stack or chimney. About 11 or 12 feet from

the vertical center line of the converter is a large vertical opening into which the gases pass. The opening is about 17 feet tall. The flat bottom of the chimney rests on the converter platform. The chimney rises alongside the converter building to a height of about 40 feet above the mouth of the converter. The chimney is built of structural channels. It is neither lined nor water cooled. From the flat bottom of the chimney a chute leads down, for the purpose of discharging steel pellets and dust into railroad cars. The chimney catches all smoke and sparks, if the vessel is kept in a pre-determined position during the regular blow.

Whether or not total enclosure and recovery of dust (metal-oxides) pays form a monetary standpoint has not yet been found out. In Germany, the dust contained enough vanadium to make dust recovery remunerative.

The rate of discharge of dust from a converter is not constant during the period of the blow. The thinner the bath, the greater is the rate of dust production, presumably because the metal is more thoroughly atomized and, for that reason, offers a greater surface to the air stream. The term "bath", while in common use, is not strictly correct, because, during the blow, the content of the vessel is nothing but innumerable pellets which are floating and dancing on the air stream.

Thin baths are found at different times, for instance, while the vessel is righted and while it is being laid down. During both periods, the blast is on, so as to keep the iron or steel from running down through the tuyeres. In a partly tilted vessel, the edge of the bath is very thin. In consequence, very thick and heavy brown smoke is emitted while the vessel is being tilted up or down. The shorter the time of tilting, the shorter is the period of producing heavy smoke. In visiting German steel works, the author passed the remark that the German engineers appeared to be behind the times, because they tilted their converters by hydraulic power instead of using the more modern electric power transmission. The answer was that hydraulic power was used advisedly, for two reasons. In case of power failure, the accumulator will permit tilting the vessel; and furthermore, hydraulic power permits quicker tilting than electric power does. There are, of course, limits to the speed of tilting. The vessel must not be laid down so rapidly that steel slops out.

Another feature in smoke production may be studied in connection with tilting. Iron or steel does not run back through the tuyeres, until the pressure has been reduced to 6 psi. or less if the tuyere tiles have standard length. The author discovered this fact long ago while experimenting with a mercury-bath converter. Any steel plant can readily prove or disprove the correctness of this statement by building an experimental converter with a few tuyerer tiles. Even one tuyere tile will give the answer. It is admitted that iron or steel running down through the tuyeres makes a mess; however, that does not matter in an experimental baby converter. A low blast pressure results in less smoke. It is understood that during the regular blow, the pressure must be high, for the purpose of atomizing the charge.

The greatest smoke producer in the operation of a converter is the so-called "green bottom". After a certain number of blows (never more than twenty) the bottom has been worn thin and uneven. The blower decides, when it is time to change bottoms. The so-called green bottom is actually not green. It has been thoroughly baked. The green part comes in from the fact that the edge or rim, of the bottom is smeared with clay and graphite. The new bottom is pushed up against the lower end of the vessel and is quickly fastened by swinging bolts and wedges. A charge is then run into the vessel. However, the new charge is only about 35 per cent of the weight of a regular charge, which means that the bath is thin. If the light charge is blown for three or four minutes with full pressure, extremely dense and heavy smoke is discharged. The extreme heat of this blow dries the luting between bottom and vessel quickly. If a leak should occur, the loss would be comparatively small. If no leak is discovered during the short blow, the vessel is filled to the regular weight of charge and the blow is finished.

If the light charge were blown with reduced pressure, much less smoke would be produced. Doing so would produce a less intense heat, and the drying would take a little longer, which fact is considered to be objectionable by the superintendent, because it slightly reduces the output per day.

If a method could be found of drying the luting quickly by other means, the truly objectionable smoke might possibly be eliminated and the total enclosure might possibly become unnecessary. This would follow the coal smoke rule that light gray smoke is permitted, while heavy black smoke is forbidden. The author has thought of placing a ring-shaped container of cardboard or steel on the bottom, close to the luting mixture. A fuse, lighted when the bottom is being pushed up would ignite a mixture of powered coal and gunpowder in the ringshaped container. A small amount of air could be admitted through the bottom at that time. This thought may be a pipe dream, and yet, it may work. If anybody has a better scheme, the author will promptly forget his own.

* * *

Builds World's Largest Reheat Boiler

The world's largest reheat boiler to generate steam for electricity has been purchased by Consolidated Edison Company from The Babcock & Wilcox Company. Engineers of The Babcock & Wilcox Company point out the new boiler will be as high as a 14-story building and will produce 1,200,000 pounds of steam per hour or sufficient to generate electricity for a city of 400,000 people.

The mammoth boiler will initially burn oil, with provision for future installation of coal burning equipment. It will develop steam temperatures of 1000 degrees. The water is heated while circulating through nearly 65 miles of tubes varying from two to five inches in diameter, which will be supplied by The Babcock & Wilcox Tube Company. It is designed to burn about 10,000 gallons of oil per hour or enough to heat an average five room home for 10 years.

Lone Star Steel Rapidly Increasing Service in the Southwest

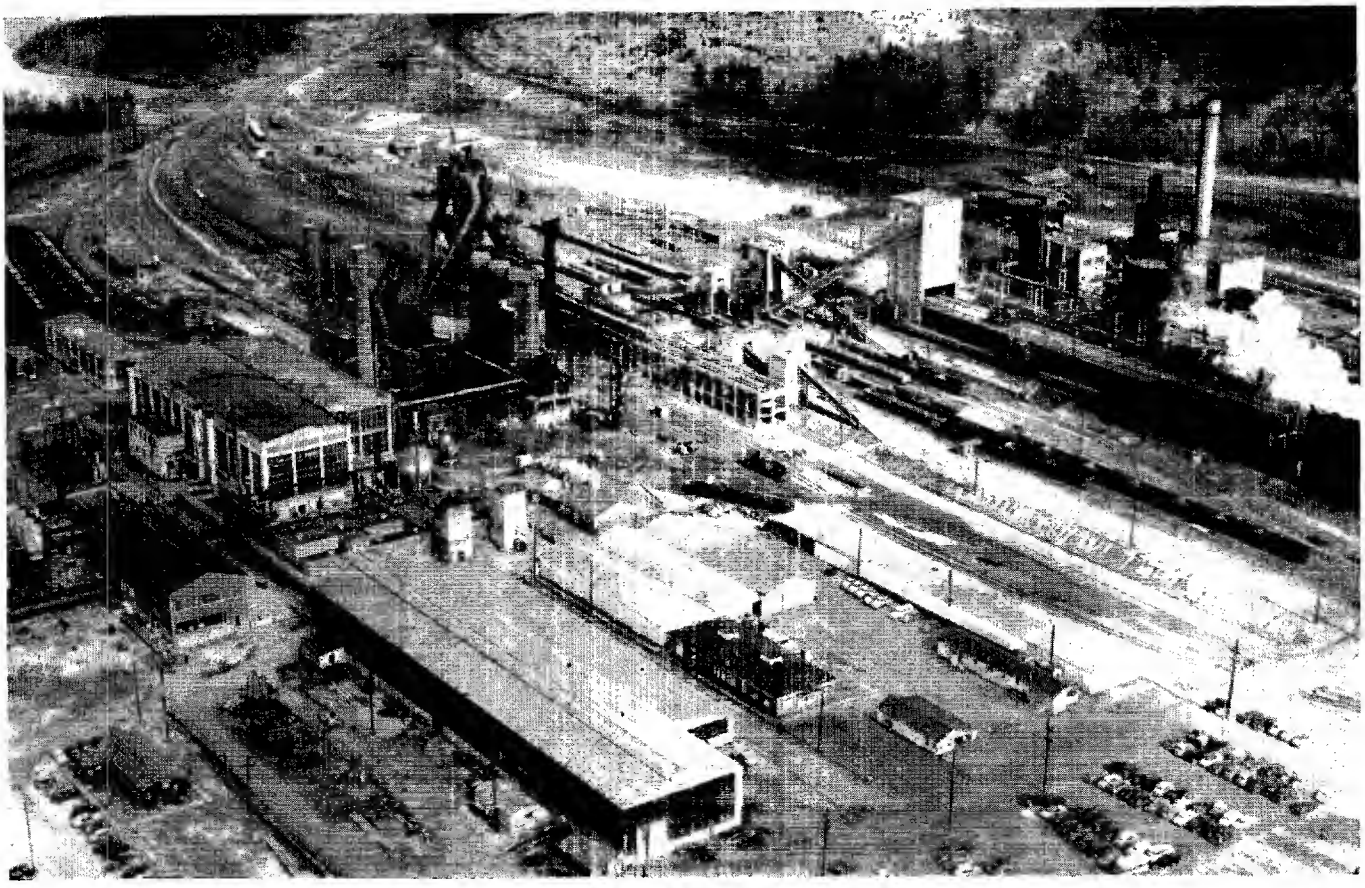
by Charles Longenecker

THE Lone Star Steel Company, which blew in its first blast furnace at Lone Star, Texas on October 25, 1947, is today a baby giant in financial structure. Its valuation is $50,000,000. Production from its Oklahoma coal mines is 2000 tons daily. Capacity of beneficiated ore for the blast furnace is 2500 net tons daily. Pig iron capacity of the blast furnace is 1100 net tons daily. Coke output is 1200 net tons daily. A cast iron pressure foundry of 80,000 net tons per year capacity is under construction.

Under the terms of the Lone Star Steel contract as originally drawn up with the War Production Board, the company was to construct and operate the plant for the government and also had an option to purchase the plant at the close of the war. Preliminary engineering work started in 1942 and the plant was completed at a cost of around $30,000,000. The War Assets Administration, which received it from the War Production Board, sold it to Lone Star Steel Company for $7,500,000 as of January 1, 1948.

On April 20, 1948, the stockholders authorized the company to take such steps as might be necessary to acquire steel making facilities which would give Lone Star a completely integrated steel mill.

Subsequently an application to the Reconstruction Finance Corporation for a line of credit for that



Aerial view of the plant of the Love Star Steel Company.

Eugene B. Germany, president of the Company.

George D. Ramsay, vice president in charge of operations.

purpose was filed and approved for $34,000,000. This loan is now available but has not been drawn down by Lone Star.

In March 1950, $7,000,000 new capital was obtained, a part of which is to be used for the construction of the pressure pipe foundry now under consruction.

The Southwest market absorbs 68% of the total U. S. line pipe production. But national capacity shows a deficit of 50%, with present facilities unable to supply but half the pipe needed. Hence the pressure pipe foundry, now being built, is an answer to one of the area's immediate needs.

The goal toward which the company is marching rapidly and steadfastly is a $50,000,000 steel plant addition.

These facilities will include four 188-ton open-hearth furnaces, having an annual steel ingot capacity of 500,000 tons; one 110-inch slabbing mill, one four-high 72-inch reversing hot-strip mill, and a line for the manufacture of 350,000 tons per years of electric-weld pipe up to 16 inches in diameter.

Physical facilities at the Lone Star plant show the extensiveness of the enterprise. Ore deposits total 32,823 acres, within a 12 mile radius, enough to carry plant production for 100 years. Electric power and steam plants are designed to give a margin for expansion. Among other facilities are the new pressure pipe foundry, the ore beneficiation plant which prepares crude ore for the blast furnaces, a big warehouse, a machine shop, a modern sewage disposal plant, a well-equipped pilot mill and chemical laboratory, a physical laboratory for coal and coke testing, a test-oven for coking tests on coal and coal blends, a pig casting machine, ample yard tracks and roadways, a hospital, a telephone exchange, restaurant, administration and office building, modern housing facilities, and guest house.

The preceding facts show tremendous growth of Lone Star Steel in its brief period of operations, as compared with the lengthy history of big steel companies. They take on even more significance when viewed in the overall picture of the company's future aims.

A variety of by-products, such as tar, benzol, xylol, tohol and other light oils, besides blast furnace slag used as railway ballast and also in highway construction, are finding ready markets. A portion of blast furnace slag also is manufactured into "Celocrete," a lightweight aggregate in heavy demand in the Southwest constructon program. All of the ammonium sulphate from the plant is sold in Texas, and the Southwest. Products of Lone Star Steel are sold in 45 states and Mexico, Brazil, China, Korea, Great Britian, Argentina and Philippines.

Eugene B. Germany, president of the Company has surrounded himself with a staff of highly trained and experienced technicians. George D. Ramsay, vice president and technical advisor, has had a broad experience in steel making and iron ore development. W. R. Bond, well grounded in steel plant operations with Crucible Steel Co., of Pittsburgh, Pa., is general manager of operations. Campbell R. Cameron is general superintendent of the coal mines at McAlester, Oklahoma. Other officers are: W. H. Johnson, vice president, controller and assistant treasurer; Nathan Adams, treasurer; Edwin S. Greer, secretary and Raleigh Hortenstine, vice president.

The foregoing pertinent facts give a brief history of this progressive company as it has so far advanced. However in order to obtain a broader conception of the present and proposed operational facilities of the company a more detailed description is essential.

The plant lies a short distance from Daingerfield which is in the northeast corner of Texas not far from the borders of the states of Oklahoma, Louisiana and

William R. Bond, works manager.

Arkansas. It is a section of the state in which there is an abundance of iron ore, and extensive oil fields. As early as 1855 there was a blast furnace in operation in an adjoining county which was burdened with ore from the same field as that now drawn upon by the Lone Star furnace. Thus, the existence of a plentiful supply of iron ore in eastern Texas has been known for many years.

The site for the furnace was selected not solely because of its nearness to these ore fields, but also because ground contours permitted the construction of a large reservoir of water nearby. And, furthermore, not far away across the border in Oklahoma were coal fields from which high quality coke could be made. The other raw material—limestone—was also near at hand. One other requirement—a means of transportation—did not present any difficulty as it was necessary to lay only eight miles of track to connect the furnace with the Louisiana and Arkansas Railroad, and through this to the main trunk lines. The plant is accessible to trucks over a network of excellent highways.

Thus the plant of the Lone Star Steel Company is very favorably situated as regards access to all of the raw materials from which pig iron and steel can be made, and to rapidly expanding markets.

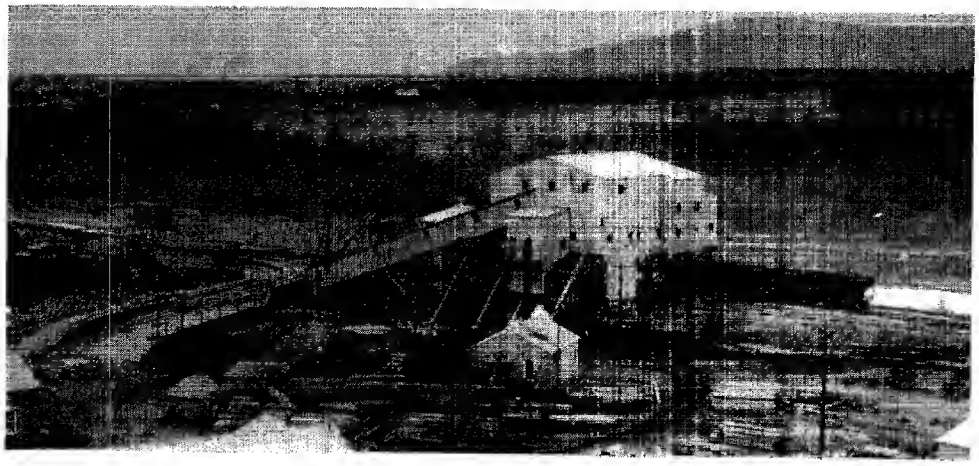
Iron Ore

The two principal types of ore found in northeast Texas are limonite and siderite; the former an oxide, the latter a carbonate. These ores lie in strata over a large area and provide estimated reserves of some 100,000,000 tons. The tested area at present is 2690 acres which is 8.19% of the holdings of the Lone Star Steel Company. From the area held by the company, and so far tested, 20,650,800 tons of limonite and 16,220,600 tons of siderite washed concentrates can be secured. The limonite when washed will analyze on an average 41 to 44% iron and 18 to 22% silica. These percentages after the concentrates have been dehydrated will approximate 48% iron and 20% silica. The corresponding percentages for the washed siderite ore are 41% iron and 12% silica, and when calcined 55% iron and 16% silica.

Both of these ores occur in the same formation, the limonite above the siderite, and above the limonite an overburden of earth. The sandy overburden is removed by dragline and the ore is loaded by Diesel powered shovels and dragline into 15-ton trucks which carry it an average of about 2½ miles to the beneficiating plant.

In the beneficiation process, the ore is crushed, washed, screened, and classified. To carry out these various treatments the ore is passed through roll and cone crushers, trommels, vibrating screens, blade mills, log washers and rake classifiers. The heavy media process is employed to beneficiate the coarse material when necessary.

After the ores have passed through the crushing and washing stage of the beneficiation process, the fines are put through a Dwight-Lloyd Sintering machine, and the coarse siderite calcined and the limonite dehydrated in rotary kilns. The Dwight-Lloyd sintering machine is 60 in. in width and 110 ft. long, and has a daily output of from 500 to 600 net tons. One of the calcining kilns is 300 ft. long and has a cooling section 125 ft. long. Both sections have an inside diameter of 11 ft. 6 in. This kiln has a daily output of calcined siderite of 1000 gross tons. The second calcining kiln is 278 ft. long with a cooling section 125 ft. long. The inside diameter is 9 ft. 6 in. and the output per day is 720 gross tons. About 15% of the product from the concentration is composed of fines of



Tipple of the Massey coal mine, the facilities of which are altogether modern.

siderite and limonite which, after being sintered, will contain approximately 46—55% iron and 15—24% silica.

Although 30% of burden is coarse limonite and is is charged into the blast furnace raw as it comes from the washers, the balance of it is roasted in order to drive off the water of dehydration. All of the siderite, however, is calcined so as to expel the carbon dioxide and reduce the sulphur content of the ore.

About 1500 to 1800 tons of beneficiated concentrate can be produced in an eight hour shift.

After the ore has been treated, as outlined, it is loaded into cars and transported three miles over the company railroad—The Texas and Northern—to the high line at the blast furnace.

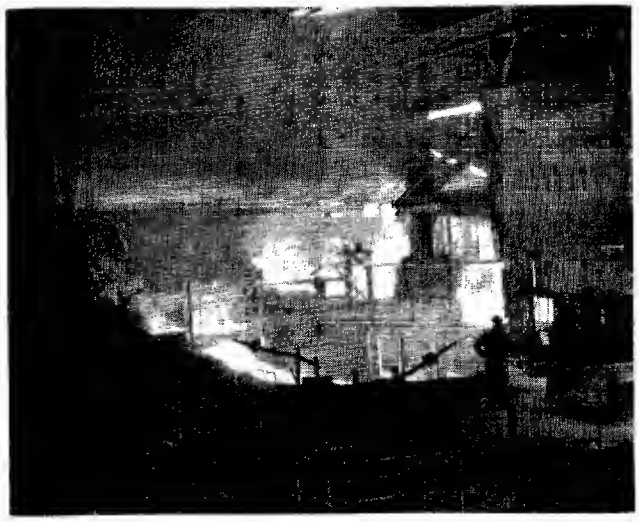
Coal

The Lone Star Steel Company besides having sufficient ore reserves to assure continuous operation for some 55 years, is also well situated in regard to a supply of good coking coal. It has at present two districts from which to draw; one, The Massey, at McAlester, Oklahoma and the other at McCurtain in the same state. The former is served by the Missouri, Kansas and Texas Railroad, and is about 240 miles from the plant; the latter is approximately 50 miles east of McAlester and involves a haulage of 253 miles. Two mines Carbon No. 5 and No. 6 are in the Massey district and from these an estimated 11,000,000 tons is available. When washed, the coal from these mines will average in analysis:

	Per cent
Moisture	2.81
Volatile matter	35.38
Fixed Carbon	59.72
Ash	4.90
Sulphur	0.44

At present the daily output from these mines approximates 1200 tons.

Coal from the McCurtain mine has excellent coking qualities. A typical analysis of this coal when washed is:



Making a cast from the blast furnace.

	Per cent
Moisture	4.80
Volatile matter	23.29
Fixed carbon	70.88
Ash	5.83
Sulphur	0.96

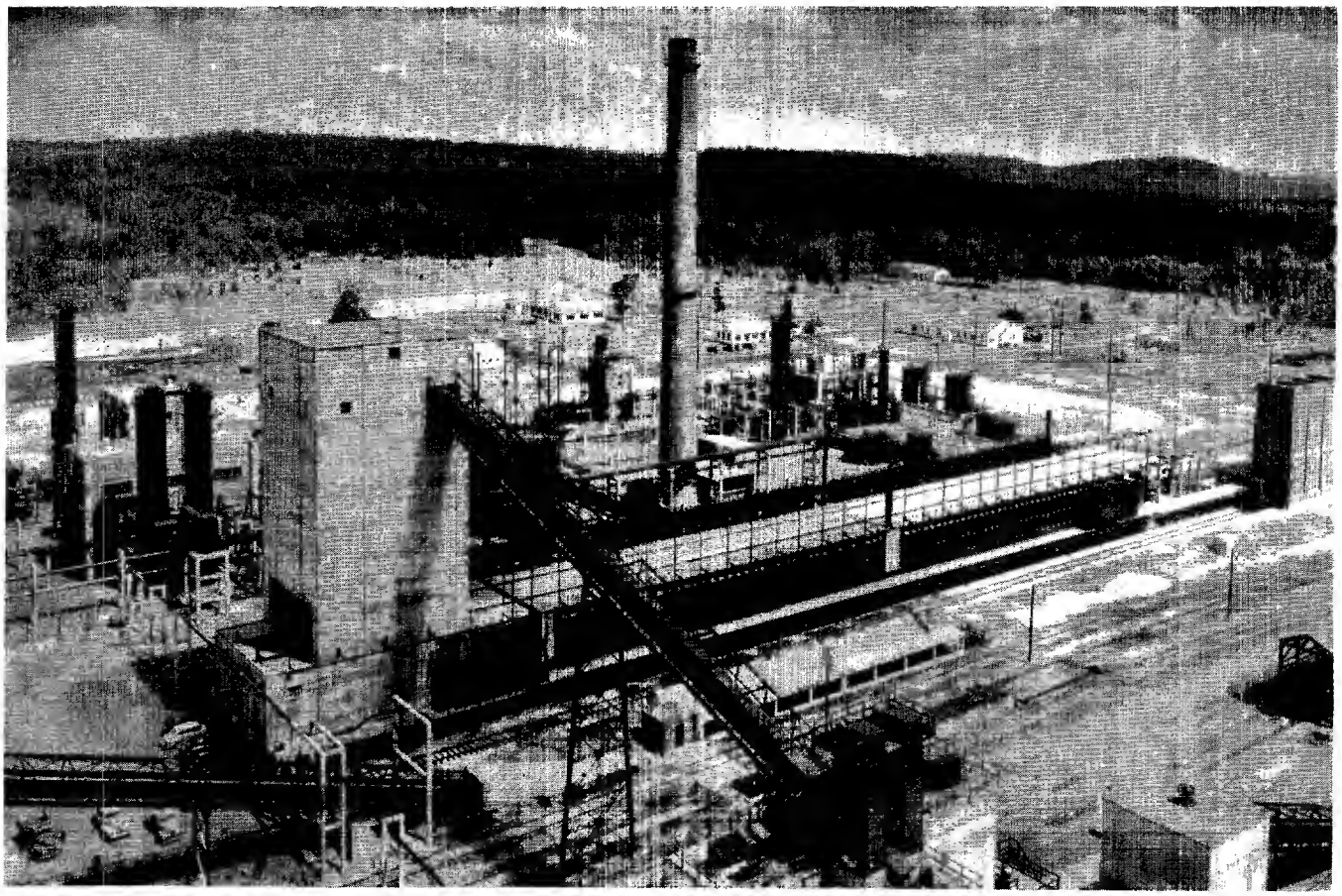
From this mine the daily output is 1000 tons. There are extensive reserves of coal in the McCurtain district, with some 12,000,000 tons as an estimated obtainable quantity. At both the McAlester and the McCurtain mine the mining and coal washing equipment is similar and modern.

Limestone

Limestone of high quality is readily obtainable from quarries at Chico, Texas which is about 180 miles west of the plant. It will analyze as follows:

Cao	54.40
Mgo	1.17
Sio_2	1.04
Al_2O_3	0.35
Feo	0.66
S.	0.018
P.	0.061

Aerial view of the beneficiation plant with kilns in the left center.



The coke oven with the by-product plant in the rear. Administration building in upper center. Hospital in upper right.

Dolomite

A necessary ingredient for obtaining a slag of the desired analysis is dolomite. Fortunately for the operation of the furnace at Lone Star, this can be obtained from a quarry near Ada, Oklahoma. This stone will analyze:

Cao	31.51
Mgo	20.28
Sio_2	0.96
Al_2O_3	0.29
FeO	0.58
S	.023
P	.018

Manganese

Another requisite in the manufacture of pig iron is manganese. The principal source of this mineral for the Texas furnace is in the state of Zacatecos, Mexico; however it can be obtained in the Batesville and Mena districts of Arkansas.

An average analysis of the Mexican ore is:

Cao	8.41
Mgo	0.55
Sio_2	14.65
Al_2O_3	1.76
FeO	2.94
Mn	43.17
S	.081
P	.280

Coke Oven Plant

The coke oven plant consists of two batteries of 39 ovens, or a total of 78 of which the daily capacity is approximately 1200 tons and a Koppers by-products plant. These ovens, of the Becker underjet type, are heated with coke oven gas. Each oven has a daily coking capacity of 1800 tons. The average width of the oven is 19¾ in., and the taper is from 21¾" on the coke side to 17¾ in. on the pusher side.

Coal is brought to the plant in hopper cars which are spotted over a gravity dump duplex type hopper by a rope car haul that has a placement reach of approximately 600 ft. From the hoppers the coal descends to vibrating feeders and from these to a 30 in. belt conveyor which in turn deposits the coal on a 192 ft., 30 in. belt conveyor. On this latter conveyor the coal is raised to a single roll crusher by which it is reduced to -1" in size at a rate of 150 tons an hour. Here a magnetic pulley removes any tramp iron. From this crusher the fine coal is carried to a hammer mill by a belt conveyor 75 ft. in length and is reduced to a fineness of 75% through a ⅛" mesh screen. As the coal falls from the hammer mill, it passed into one of two belt and bucket type elevators which elevates it to four mixer bins, each of 150 tons capacity. Distribution is made from the elevator to these mixer bins by a flight type conveyor. From the mixer bins a 20 ft. conveyor carries the finely crushed coal to the second of the two elevators by which it is raised about 85 ft. and deposited upon a 30" belt conveyor 225 ft. in length. The coal then falls from this conveyor into a three compartment, 1500 ton capacity, bin: beneath

which are the larry cars. Before the coal is discharged into these cars it is weighed, and is then taken to the ovens. The ovens are charged with about 60% of McAlester coal which has a volatile content of 35 to 37% and 40% of McCurtain with a volatile content of from 21 to 23%.

Besides obtaining some 1200 net tons of coke daily there are also obtained from the byproduct plant the following products:

Tar	12,500.0 Gals. per day
Benzol	3,667.5 " " "
Xylol	192.5 " " "
Toluol	840.0 " " "
Phenol	87.5 " " "
Ammonium sulphate	42,000 lbs. per day
Coke Oven Gas	approx. 19,250,000 cu. ft. per day

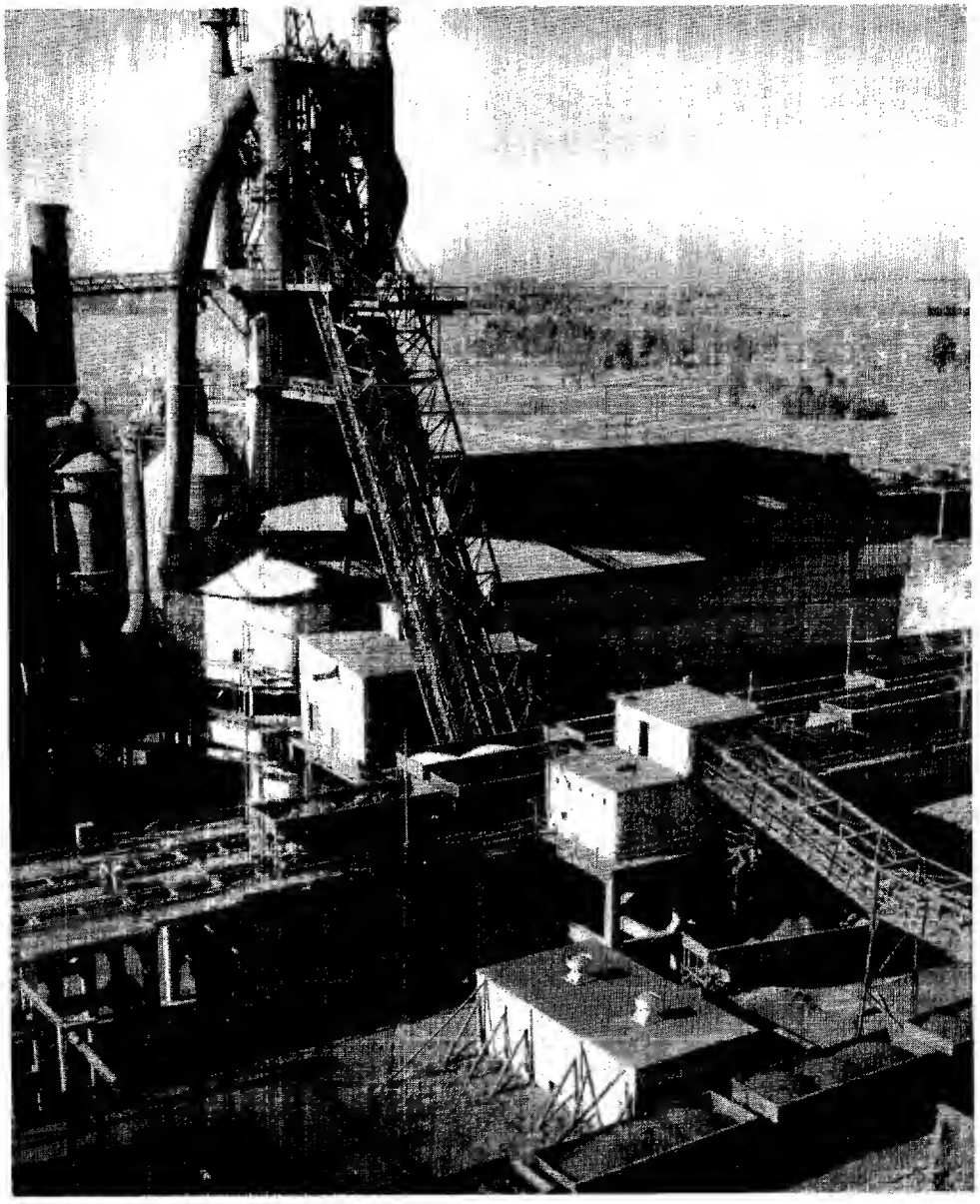
Blast Furnace

The blast furnace has a nominal daily capacity of 1,000 tons of iron. It has a height of 101 ft. 0 in. from the bottom of the hearth to the top of the lining. Other dimensions are:

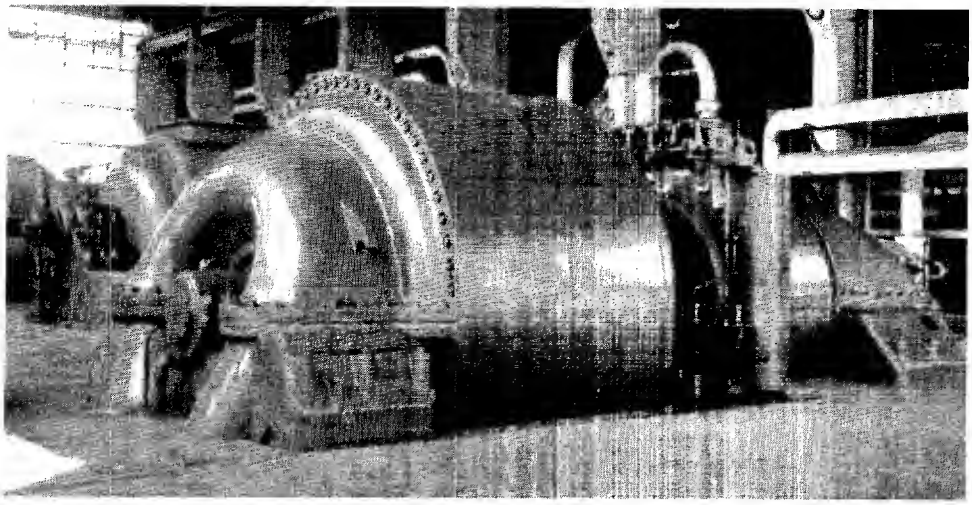
Hearth diameter	27 ft. 0 in.
Bosh "	30 ft. 0 in.
Stock line "	20 ft. 0 in.
Large bell "	15 ft. 0 in.
Small bell "	6 ft. 6 in.

Unlike many furnaces, the Lone Star furnace has three slag notches; two used in regular operation, and one when making expanded slag which is sold under the trade name—"Celocrete". Air is distributed to the furnace through eighteen tuyeres which together deliver from 85,000 to 90,000 c.f.m. when the furnace is at capacity producton. This air is received at the stoves from a 100,000 c.f.m. turbo-blower which in emergency can be supplemented by a stand-by 25,000 c.f.m. turbo-blower unit. There is also connected to the blast furnace air supply system another 100,000 c.f.m. turbo-blower which is in place but which is normally employed for other purposes.

This furnace operates smoothly on 80,000 cu. ft. of air per minute at a blast pressure of from



The blast furnace with the high-line in foreground.

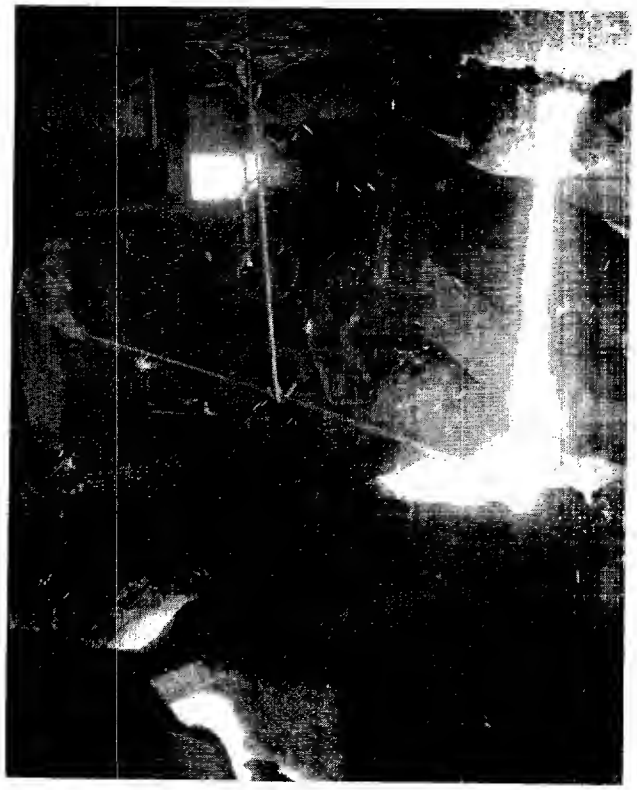


Turbo-blower of 100,000 c.f.m. capacity.

19 to 22 lbs. The average blast temperature is 1,100° F., and the quantity of flue dust produced per ton will average 180 lbs. On basic iron the coke consumption per ton of iron approximates 1831 lbs., and on foundry iron, with a burden of 30% raw ore, 20% sinter, and 50% calcined ore, 1965 lbs. The hearth is carbon lined. Distribution of the burden is made by a McKee top onto an air-operated bell.

At present raw materials—ore, coke, limestone, etc.—are fed to the furnace skip cars by charging cars loaded from 13,200 tons capacity, storage bins. The operation of the charging and skip cars is partially automatic as they are tied into a single motor skip hoist with fully automatic controls.

Air is heated in three stoves 115 ft. 6 in. in height and 25 ft. 0 in. in diameter. These are capable of producing 100,000 cu. ft. of blast per minute on a straight line temperature 1600°.



Here iron is being poured from the ladle into the pig casting machine.

The gases from the furnace pass through a conventional type dust catcher and into a gas washer which is followed by two electrical precipitrons. At the stoves the gas contains from .004 to .010 grain per cu. ft.

Slag flows through carbon lined troughs into either of two 158 ft. long slag pits from which, when cooled is removed by diesel shovels. A typical slag analysis is:

SiO_2	35.52%
Al_2O_3	14.67%
FeO	0.86%
CaO	41.29%
MgO	4.75%
S	1.15%
MnO	0.28%

The iron is conveyed in open top hot metal ladles to a pig casting machine where it is cast into pigs of the size and weight desired.

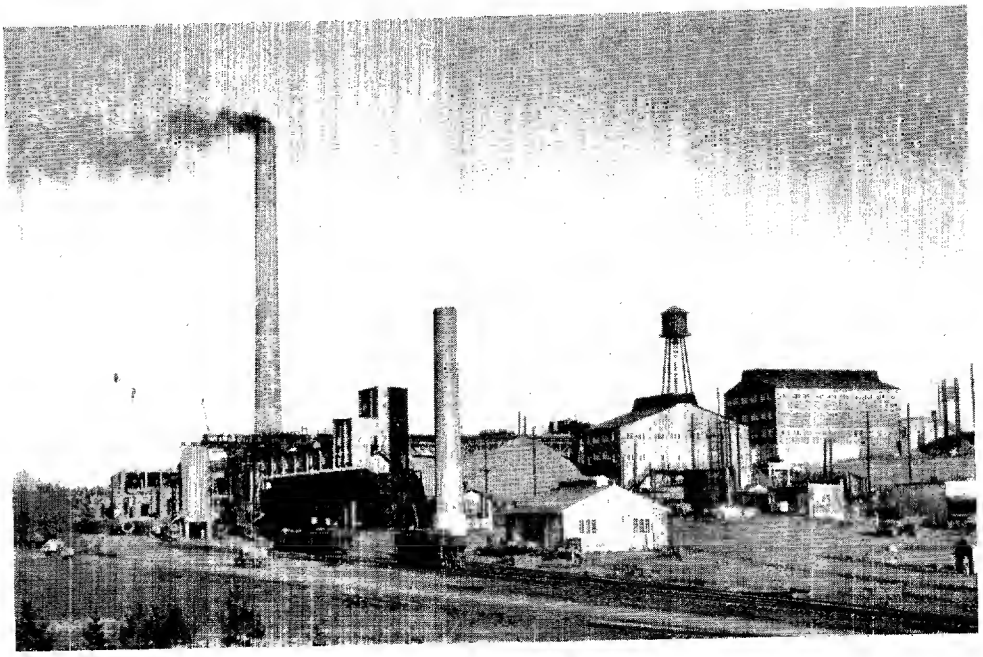
Steam and Power

All of the steam and electricity required for plant operations can be generated in a power and boiler house adjacent to the furnace. For generating steam there are four boilers; all of which have a nominal rating of 125,000 lbs. of steam per hour, but two of which can be raised to 175,000 lbs. per hour. These boilers operate at a steam temperature of 750° F and at a pressure of 425 lbs. One boiler is fired with natural or coke oven gas, and the remaining three with natural, coke oven, or blast furnace gas.

For the generation of electricity there are two turbo-generators; one of 7500 k. w. capacity, and one 10,000 k. w. capacity. The smaller turbo-generator operates at a steam pressure of 200 lbs. and a temperature 450° F., and the larger at 275 lbs. pressure and 575° F. temperature. Both turbo-generators have a speed of 1800 r. p. m.

Water can be obtained from two sources. That for drinking is secured from a well 400 ft. deep; and water for plant service is pumped from a reservoir which covers 1800 acres. The water fed to the boilers is given the Zeolite treatment.

In an emergency power can be transmitted into the plant from the Southwestern Gas and Electric



In beneficiation, ore is received in building at extreme right and is discharged into railroad cars at extreme left.

Company's lines. Current is received at 66,000 volts and is reduced.

Cast Iron Pressure Pipe Department

As was mentioned in the forepart of this description, the Lone Star Steel Company has at present underway the construction of a department for the manufacture of cast iron pressure pipe. The annual output of pipe and fittings will approximate 80,000 gross tons in diameters from 4 to 12 in.

For manufacturing purpose an existing building will be utilized. This building, made up of two spans, one 55 ft. 8 in. wide and the other 71 ft. 8 in. wide, is 345 ft. long, and has a lean-to, 75 ft. wide, extending its full length. All facilities will be modern.

Pipe will be cast in four DeLavaud centrifugal machines and then carried by an automatic conveyor system to the annealing furnaces. They will then be hydrostatically tested, dipped in tar, weighed and given a final inspection. The flow of material will be in a direct line.

The Steel Plant

As a further indication of the aggressiveness of the officers of the Lone Star Steel Company, it is their intent to begin the erection of a plant for the manufacture of steel pipe and steel products in the near future. Although most of the steel from this plant will go into the fabrication of pipe, a considerable tonnage will be available as blooms, skelp, plates, etc.

According to plans already completed by the company, it is the intention to erect a plant with a yearly ingot tonnage of 500,000. Steel will be melted in four, 188 ton open hearth furnaces from hot metal and scrap. The ingots will be heated for rolling in soaking pits, and then broken down on a slabbing mill after which the slabs will be further reduced on a 44 in. by 110 in. plate mill which will also be employed as a rougher for a reversing skelp mill. The plate mill will be equipped with vertical edging rolls driven by a 2000 h. p. motor. Before the slab enters the plate mill it will be given a wash heat in a furnace having an effective heating length of 70 ft. and a width of 27 ft.

After the plate has been rough reduced it will pass over a roller table to the reversing skelp mill. This mill is 4-high with 27 in. work rolls, and 49 in. backing-up rolls, both with a face of 72 in. It will be driven by a 7,000 h. p. motor and will be equipped with coiling furnaces in which the upcoilers will be driven by a 600 h. p. motor. The widest skelp rolled will be 66 in. Skelp of rimmed steel can be coiled up to .375 thickness, and killed steel to about .312 in. in thickness. All casing pipe will be heat treated.

Iron Blast-Furnace Slag Ouput Shows a Moderate Increase in 1949

A new record output of 21,581,379 short tons valued at $24,578,712 was established by the iron blast furnace slag processing industry in 1949. These figures were obtained from a canvass conducted by the National Slag Association in cooperation with the Bureau of Mines, United States Department of the Interior. Included is the output of 66 plants (41 companies) processing air-cooled slag and 10 plants (7 companies) processing expanded slag.

Screened air-cooled slag, the major product, amounted to 17,769,330 short tons valued at $21,090,445. Of this total 15,879,737 short tons, or 89 percent, were used as railroad ballast, aggregate for portland cement concrete, in bituminous and for other types of highway construction. The manufacture of mineral wool and the use for roofing, concrete block, airport construction, agricultural, sewage trickling filter medium, and miscellaneous uses consumed the balance.

Unscreened air-cooled slag processed during the year totaled 727,595 short tons valued at $372,727, both slightly in excess of the 1948 figures. As in former years, this material was consumed in highway construction (other than in portland-cement concrete and bituminous construction), railroad ballast, and for other uses.

The amount of granulated slag processed in 1949 increased substantially while expanded slag declined, in comparison with 1948 totals.

Rolls and Rolling

Channels

by E. E. Brayshaw
Continental Roll & Foundry Company

Part XVIII

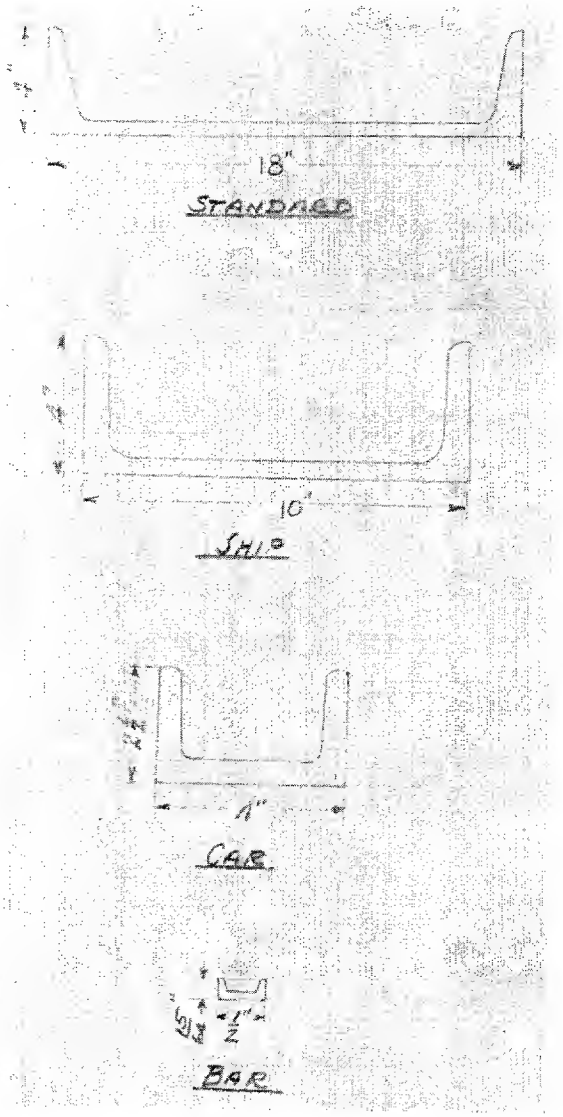
CHANNELS are rolled in many sizes and shapes. There are, for example, standard structural, ship, car, bar, box and any number of special purpose channels. Fig. 1 shows some of the standard types, whereas, Fig. 2 is illustrative of the special purpose group. Note the range of the depth of the sections—½″ to 18″. Equally variant are the sizes and types of mills producing channel sections.

The principles of design discussed under the rolling of beams apply also to the design of channels. There are three methods used in the production of channels; (1) the butterfly method which gets its name from the shape of the developing passes, (2) the beam method, sometimes referred to as the counter-flange method, and (3) the bending-up method which is a combination of methods 1 and 2 (butterfly and beam). Each of these methods has its distinct advantages and specific applications. Therefore, each method will be discussed separately.

Butterfly Method

In the butterfly method the starting section is usually a slab, the width greatly exceeding the thickness. Illustrative of the early approach of using this method for the production of channels is Fig. 3 which shows the design for a 9″ channel rolled on a 20″ mill in 1877. In this design all the bending was done at the flanges, the web being maintained flat in the horizontal plane of the rolls. Using the same principle, later designers resorted to arching the web in addition to bending the flanges. Fig. 4 illustrates the pass design for rolling 6″ ship channel. Here, with flanges and web bent, the bar more closely approximates the butterfly shape. A 10⅜″ x 4″ slab is entered pass #1 to be finished, in 9 passes, to the 6″ section. A larger mill, used in conjunction with the mill producing the noted section, prepared the 10⅜″ x 4″ slab from an 11″ x 6″ slab. By this arrangement a longer finished bar could be produced and better finished cutting could be accomplished with a resulting increase in yield. From an examination of the finished section, pass #9, it is evident that there is a very reduced flange angle. This method of design is particularly applicable for producing sections with small flange angles.

This method of section development is advantageous from the standpoint of working the bar all over. With the flanges receiving as much direct rolling as the web, it follows that the tensile strength for flanges and web will be practically the same. Therefore, channels produced by this method have good



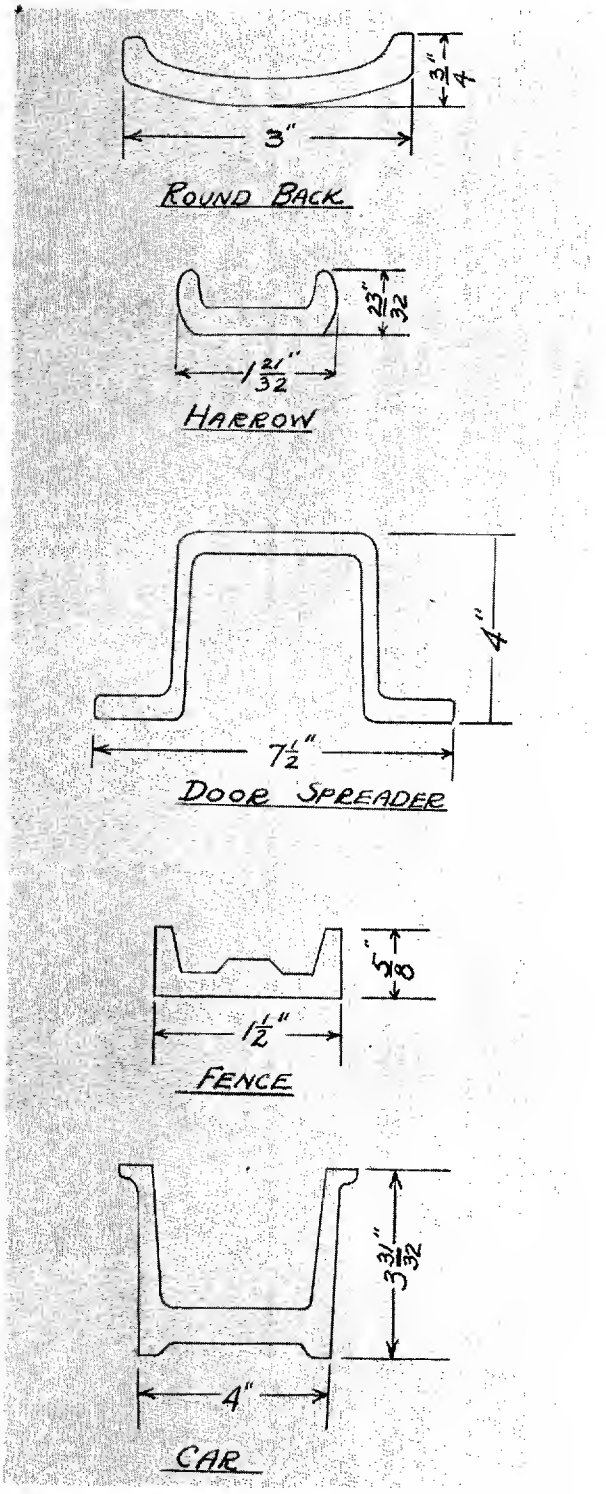


Fig. 2

physical properties. The heavy reduction is made by slabbing action before the actual bending begins. An interesting feature must be considered in the bending process. Actually, in pass contact, the bending is performed before the reduction is effected. One roll bends the bar around the other. In this design all the flanges are made in live holes. This means that with proper consideration for elongation, good filling of the flanges can be effected.

Fig. 5 reveals that this type of design is equally as applicable to bar size channels as to structural sections. Here a 2¼" x ¾" slab is rolled in five passes to a 1" x ⅛" channel. The 2¼" x ¾" slab was made from a larger size billet in other passes of this merchant mill arrangement. Note that the joints (opening of the pass at the parting of the rolls) are reversed from pass to pass even though the flanges are all live holes. The fillet "A" of pass #2 fits at the joint "B" of pass #3. This fillet is designed with two thoughts in mind; (1) to protect the bar from overfilling at joint "B" in pass #3, and (2) to so fill pass #3 as to give good rounding for fitting the radius of pass #4 at "E". Too sharp a toe at B (due to thinness) will cool rapidly and will result in excessive wear on pass #4 at E. This wear will cause a ridge to be cut into the pass, which will result in marking the finished bar since not enough reduction is made at the finisher to iron out the mark. The fillet C of pass #3 must be designed to give fin protection at the joint D and also at the joint of the finishing pass.

Shown in Figs. 6 through 6E is a modified design of the butterfly method. This design is used to produce a standard structural 3" channel. The first different feature is the use of a square billet instead of the slab type normally used with the butterfly design. Here a 2-13/16" square is entered pass #1 Fig. 6. Note that this pass starts to approximate the shape of a beam blank which was discussed under the design for rolling beams. This pass is of particular value in producing a bar with uniform flange dimensions for subsequent rolling in live holes. The lower part of the pass carries relatively sharp corners; whereas the corresponding top half carries well rounded corners.

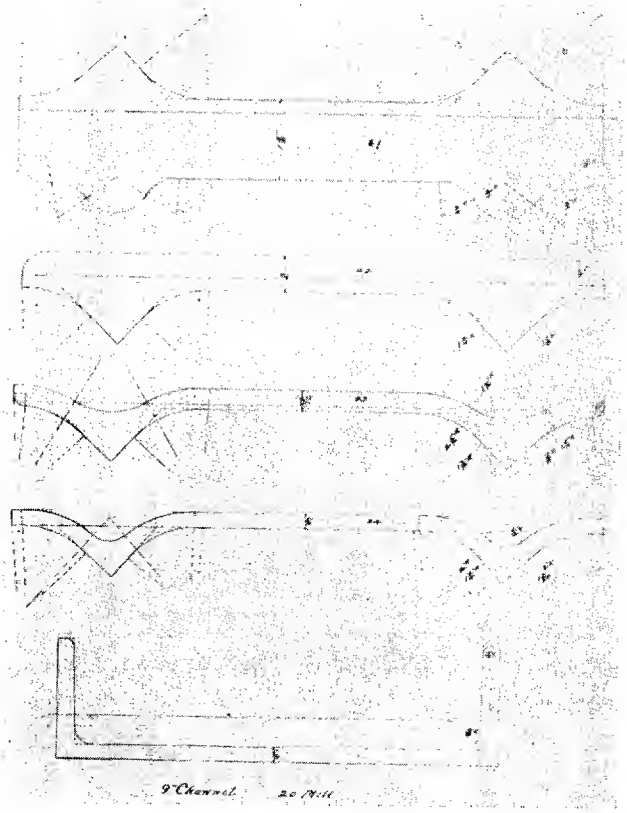
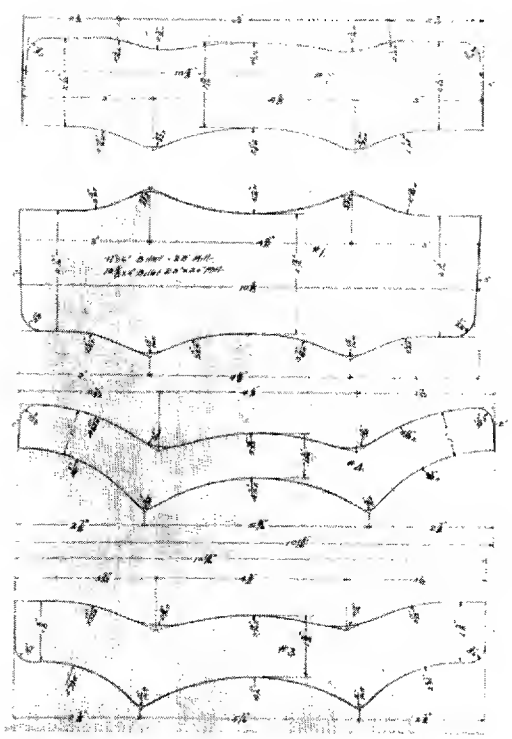


Fig. 3



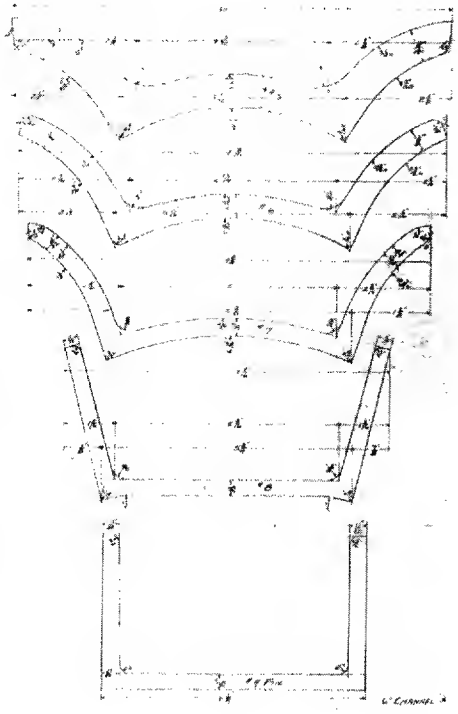


Fig. 4

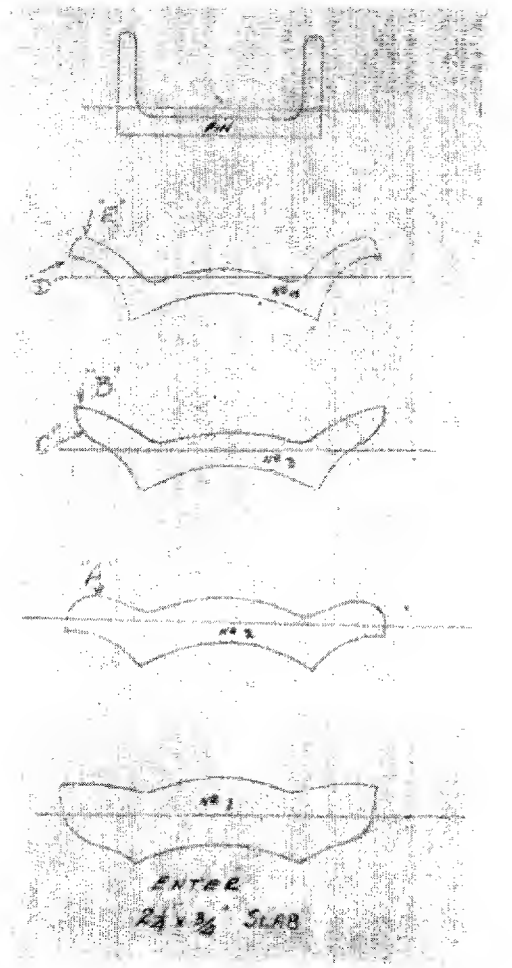
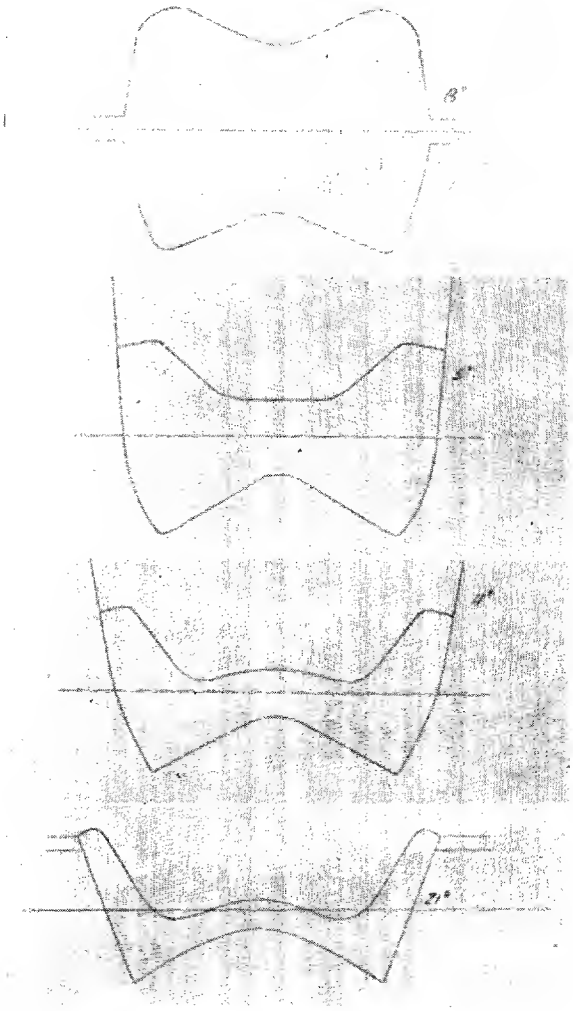


Fig. 5



Top to bottom: Fig. 6, Fig. 6-A, Fig. 6-B, Fig. 6-C,

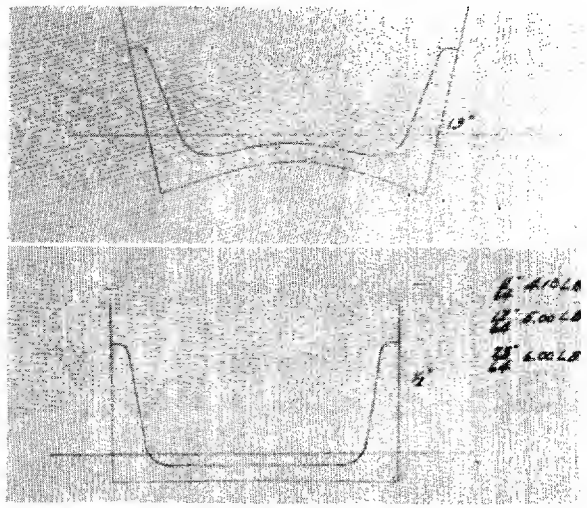


Fig. 6-D, Fig. 6-E

The sharp corners are designed so as to assist in producing a sharp cornered finished channel. The well rounded corners are designed so as to give protection against finning in the subsequent live flanges. The butterfly resemblance becomes more pronounced in pass #2, Fig. 6A. In four more passes the 12-13/16″ square has been developed into the 3″ channel. Note the gradual web bending from the deeply arched position of Fig. 6A to the full rounding of the leader pass Fig. 6D. The lower taper of the double tapered side of pass #2, Fig. 6A, is designed to fit the corresponding lower tapered portion of pass #3, Fig. 6B. And this tapered portion of Pass #3, Fig. 6B carries approximately the same taper used in pass #4, Fig. 6C.

Ship Channel with Thin Flanges

Another application of the butterfly shaping is illustrated in Figs. 7 and 7A. This design is used to roll a 12″ ship channel with thin flanges. Forming of the flanges begins in pass #1. As noted in Fig. 6, when a somewhat similar pass was used as the first roughing shape, this pass develops flanges of uniform length for the ensuing live flanges. The effect of web arching in connection with pass width is clearly shown in this design. The distance across the corners of the web of the channel are

Pass 1	9⅛″
2	9⅝″
3	9 15/16″
4	10⅞″
5	11-13/16″
6	12-3/32″

In passes 1 and 2 of the finishing rolls slight projections are designed on the outside corners of the channel. These will be discussed under the rolling of channels by the beam or counterflange method. The joints of passes #2 and #3 open at the same point. This is quite permissible because of the small reduction that is designed into the last pass. The flange length of the leader pass, exclusive of the added projection, which projection is too small to effect any pushing up action of the flange, is equal to the finished flange length.

Figs. 8A and 8B show the pass arrangment for the design of Figs. 7 and 7A. Fig. 8 shows the roughing rolls used with this design. Instead of entering a rectangular slab into pass #1 of the intermediate rolls, this slab is pre-formed or shaped in pass #3 of the roughing rolls—Fig. 8.

An inspection of any of the figures illustrating this method of design will reveal that this design presents the easiest work for flange guides. Another advantage to this design is that it produces a higher yield than can be obtained by the beam method. This is true for two reasons. First, this design closely follows the law of equal work distributions, the web and flange being worked uniformly. As a result the elongation of both parts is relatively the same, which, in turn, climinates the long tongue formed at the web

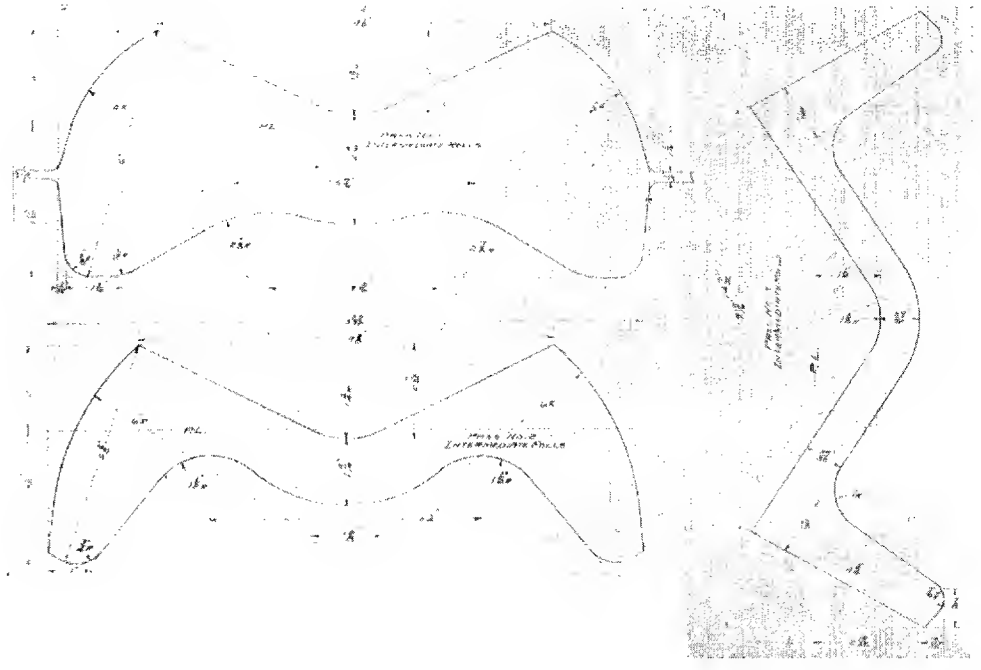


Fig. 7;

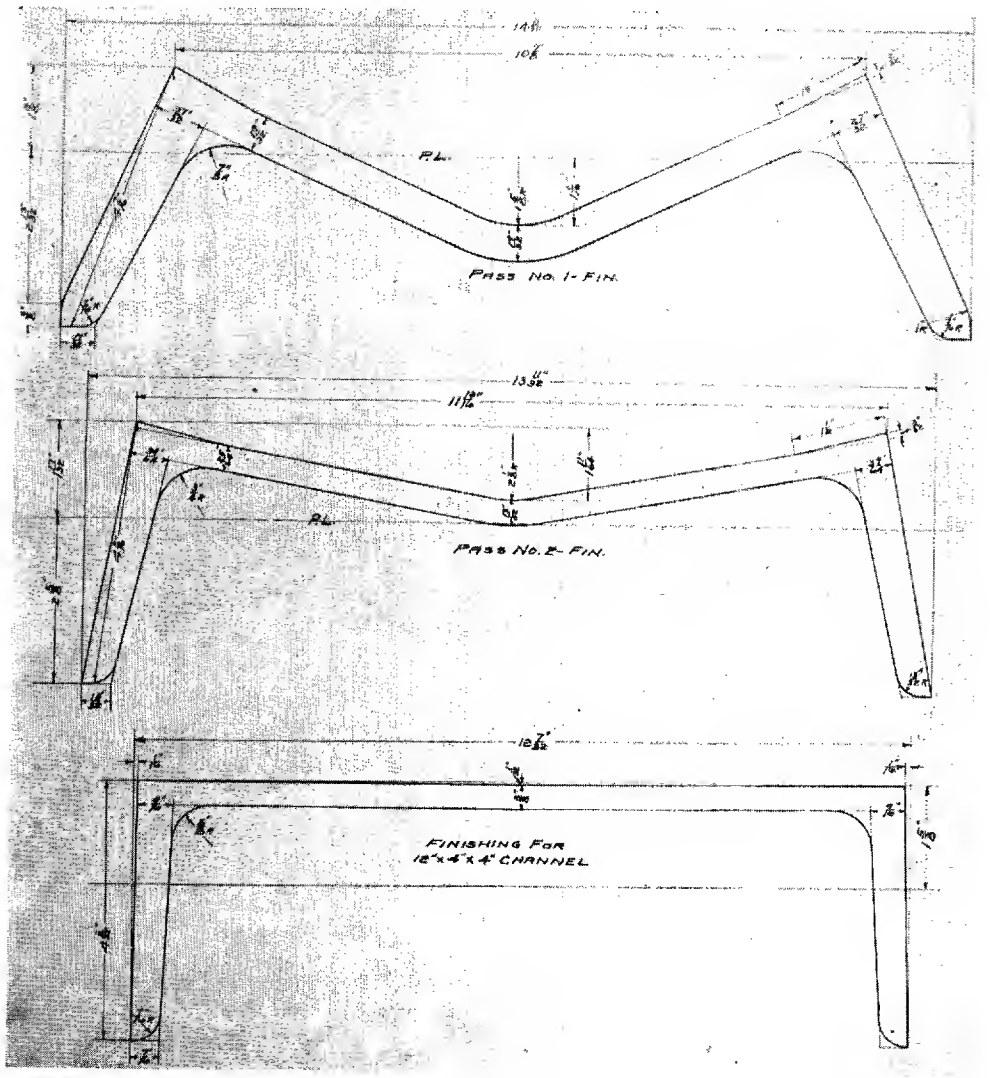


Fig. 7-A

when the design has effected greater elongations on the web than on the flanges. Therefore, it is possible to make a shorter crop to cut the bar back to a uniform section. Second, this design eliminates underfilled flanges as found in the rolling by the beam method.

However, there is a drawback to this method of design. Rolls cannot be adjusted for producing various foot weights as readily as in the beam method. The slightest roll adjustment (raising rolls) results in rapid thickening of the flanges, which, in turn causes excessive flange work. In addition, being flat and-or flared out, the passes require longer roll body space. This has been a limiting factor on some mills. However, this drawback is offset slightly by the ability to draft web and flanges uniformly and consequently heavily so that is has been possible to roll in fewer passes than required by the reduction schedule of the beam method.

Beam or Counter Flange Design

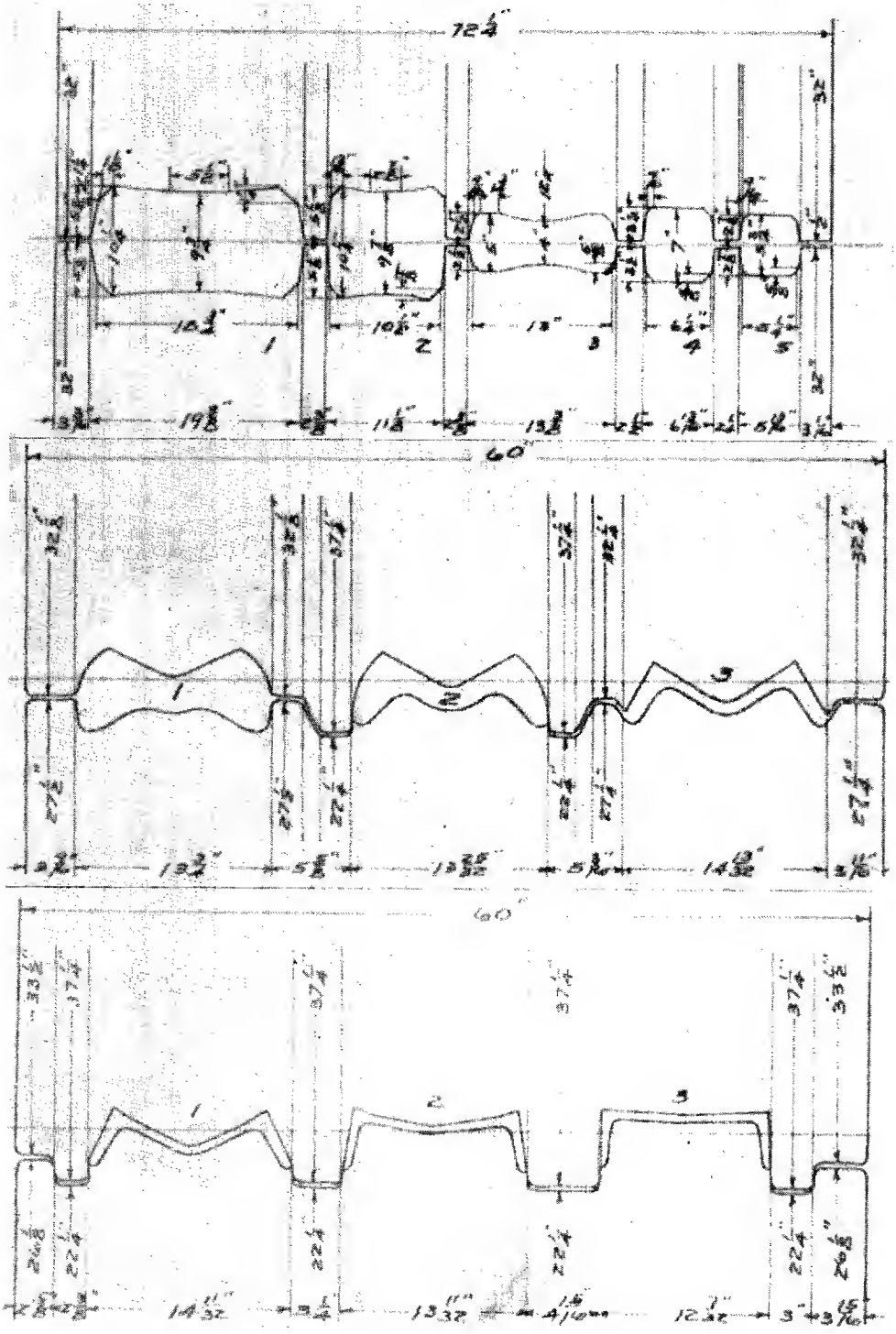
Perhaps the most common and most popular method of producing channels is by the beam or counter flange design. As in the case of the butterfly design, channels of all sizes have been successfully produced by this design. Being similar in shape to the beam, this design follows closely the method and principles used in producing a beam. Fig. 9 illustrates a 7″ channel layout. This design employs a 6″ x 7″ bloom as entering section. As noted in the rolling of beams, it is equally as important in the rolling of channels to give serious consideration to the cutting-in action of the first passes. The tongue or V of the middle roll (Fig. 9) should compress as small a portion of the bloom as practical, and still permit further reasonable web reductions through the remaining passes. This tongue can be likened to the business end of an ax. The narrower and thinner the blade or tongue is, the easier and deeper does it sink into the wood. There is a practical limit to which this thinness can be carried in either application. The more blunt this tongue or V, the greater is the force required to sink it into the hot bloom. Also with blunt or rounded cutting-in the tendency is to pull the flange down, running the metal out into elongation rather than giving it the opportunity to flow up to fill the flanges. Speed of rolling also has an affect upon this flowing. The faster the speed the greater the tendency toward elongation.

The width of bloom or billet entering the first pass should closely approximate the width of the pass. The purpose for this is three-fold. First, the closer the fit the greater the pulling-in affect of the rotating collars of the closed pass. This aids in reducing the ragging necessary to make the rolls bite. Second, if too

much clearance between the bloom and the sides of the pass is allowed, the metal which normally would flow to fill the flange, will spread to fill the pass, which results in robbing the flanges. Third, with too much clearance it is possible for the bloom to shift toward one side of the pass, which will result in uneven flange height. It is not advisable to make the bloom the exact width of the pass, for to do so would cause excessive wiping of the sides of the pass, with consequent rapid wear of the rolls. A reasonable spread is allowed, i. e., each succeeding pass is made wider than the preceding pass. This procedure prevents excessive side wear of the passes.

In the design illustrated by Fig. 9, passes #1 and #2 work over top of one another, as do passes #3 and #4. This is not a desirable arrangement, but must be resorted to because of the limited roll body length. With pass #2 working over top of pass #1, it is impossible to stop the flow of metal downward as it attempts to fill the bottom flange (the one which is gradually worked off). This bottom flange of pass #2 is the top flange of pass #1, the flange which is the desired end point.

Figs. 10, 10A and 10B show another arrangement for producing channels. Here a shape is entered pass



Top to bottom:
Fig. 8, Fig. 8-A, Fig. 8-B

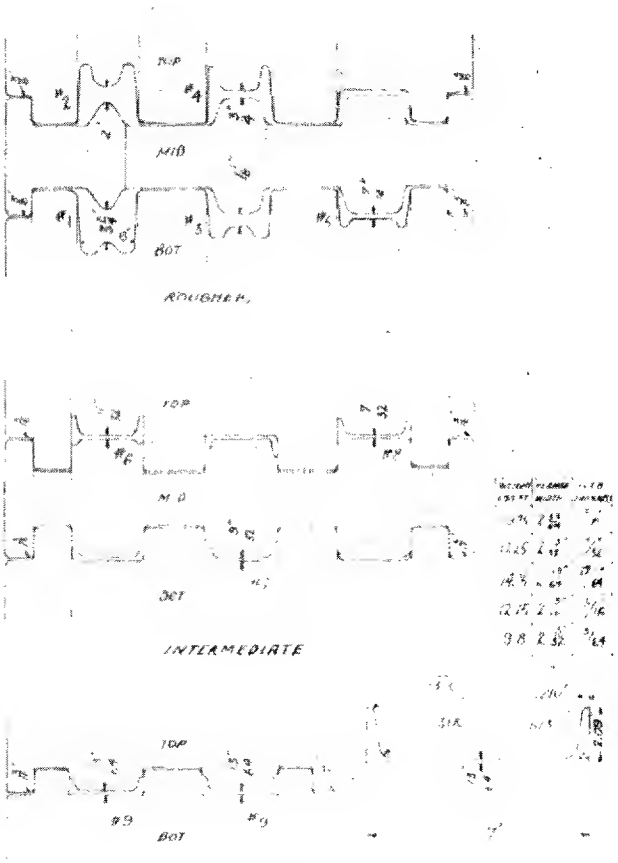


Fig. 9

#1 and in nine passes is reduced to a 15″ channel. By this arrangement only one pass, because of limited roll body length, needs to be worked over another. In pass #3 the bottom flange is partially worked off. It is this partial flange that gives this method its name—counter-flange. From this point on there is a successive reduction in this flange. Since pass #4 does not work over top of another pass, this working-off is continued by the stop at the heel of the pass, even though this short stopped-off flange acts as a live hole. The large fillet at the outside corners of the heel of pass #3 prevents the formation of fin at the heel of pass #4. The successive reduction of the bottom flange aids in preventing the wire drawing or robbing of flanges. The work exerts a pressure, holding up the desired flange.

Figs 11, 11A and 11B show a most desireable pass arrangement for producing channels. In this instance all passes are individually located permitting the designer the maximum flexibility for pass design. The design of Fig. 11, 11A, and 11B is rolled on a standard structural mill comprised of a breakdown stand and three finishing stands in line. Note that the breakdown stand prepares the bloom to a rough shape. The same rolls that made the beam shape for the 15″ beam previously discussed are used for the 15″ channel. It will be noted from Figs. 11, 11A and 11B that the flanges are rolled alternately dead and live. In order that the flanges might release themselves from the rolls, a slight

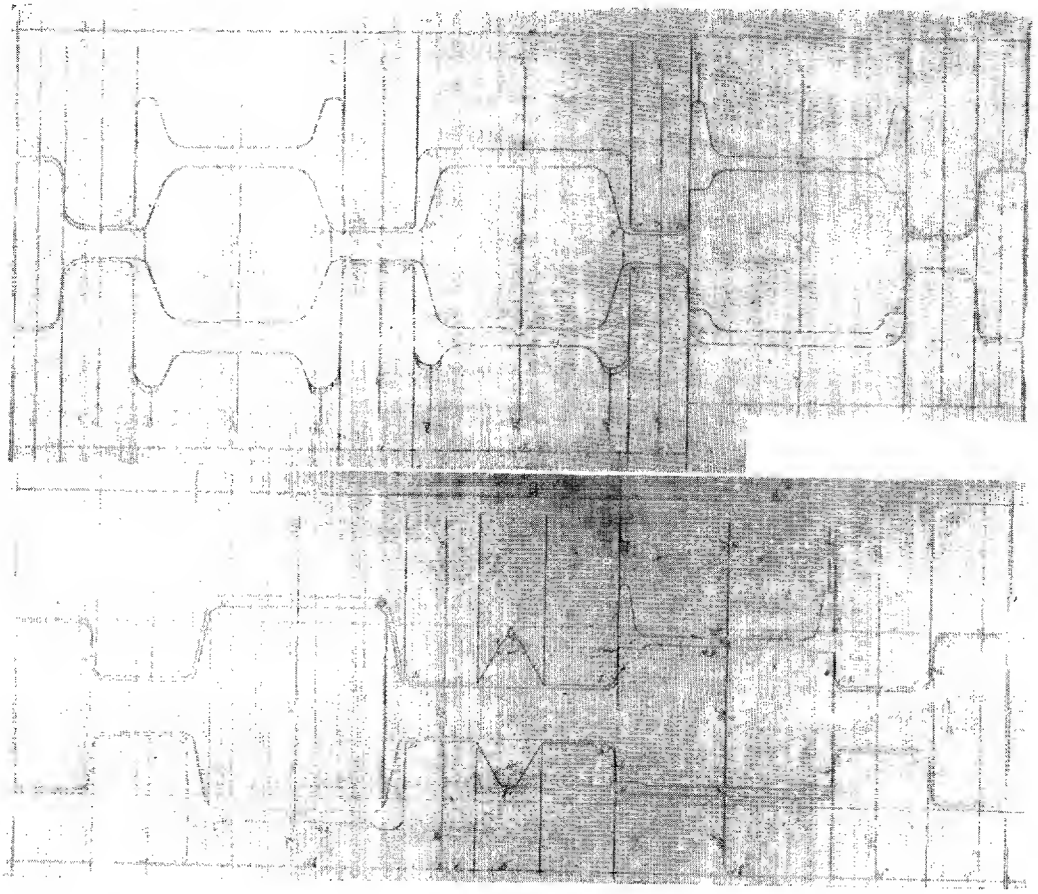


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Fig. 10, Fig. 10-A

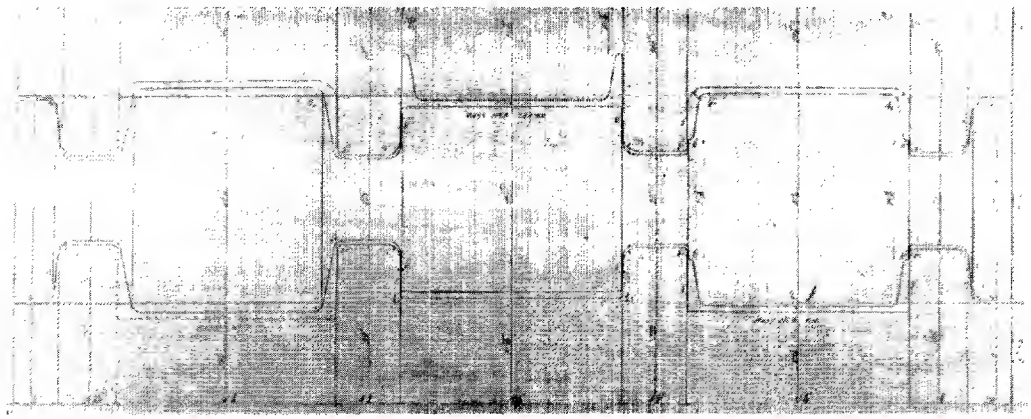
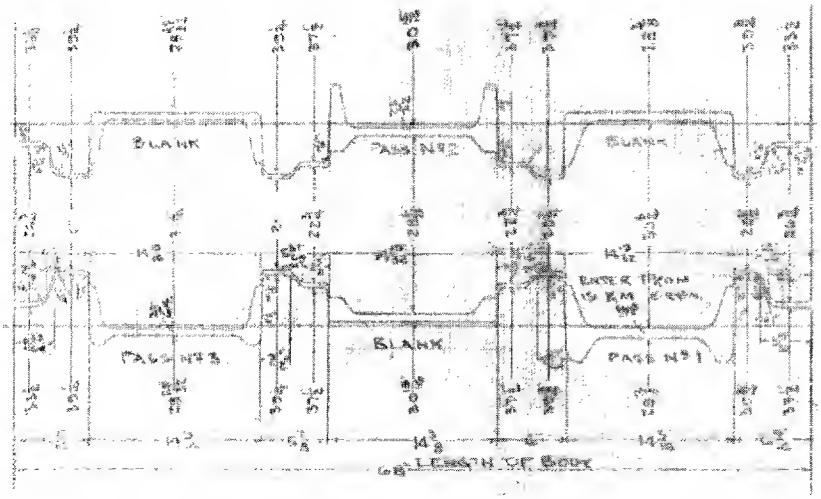
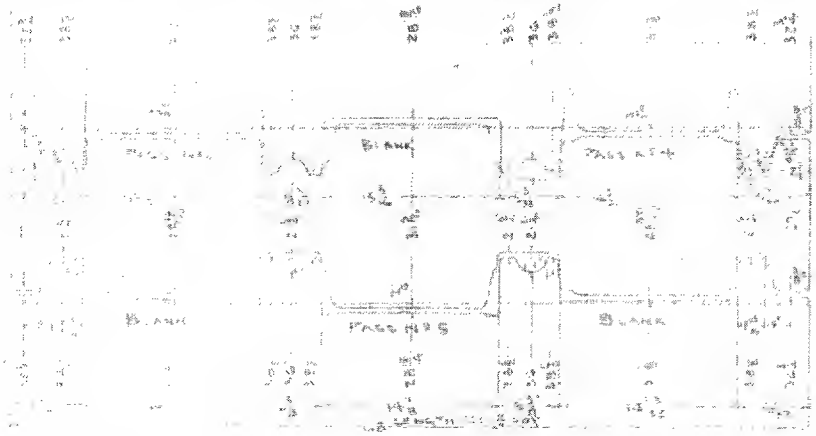
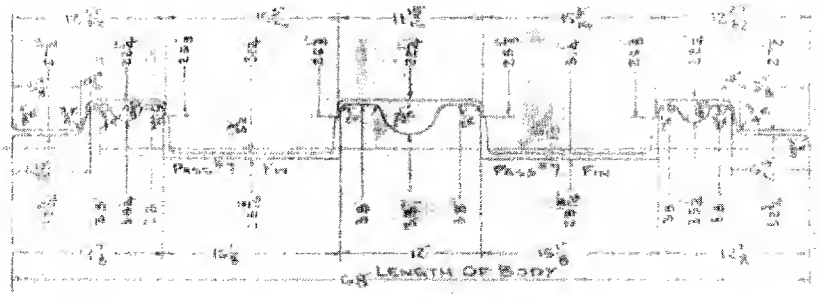


Fig. 10-B







Top to bottom: Fig. 11, Fig 11-A, Fig. 11-B

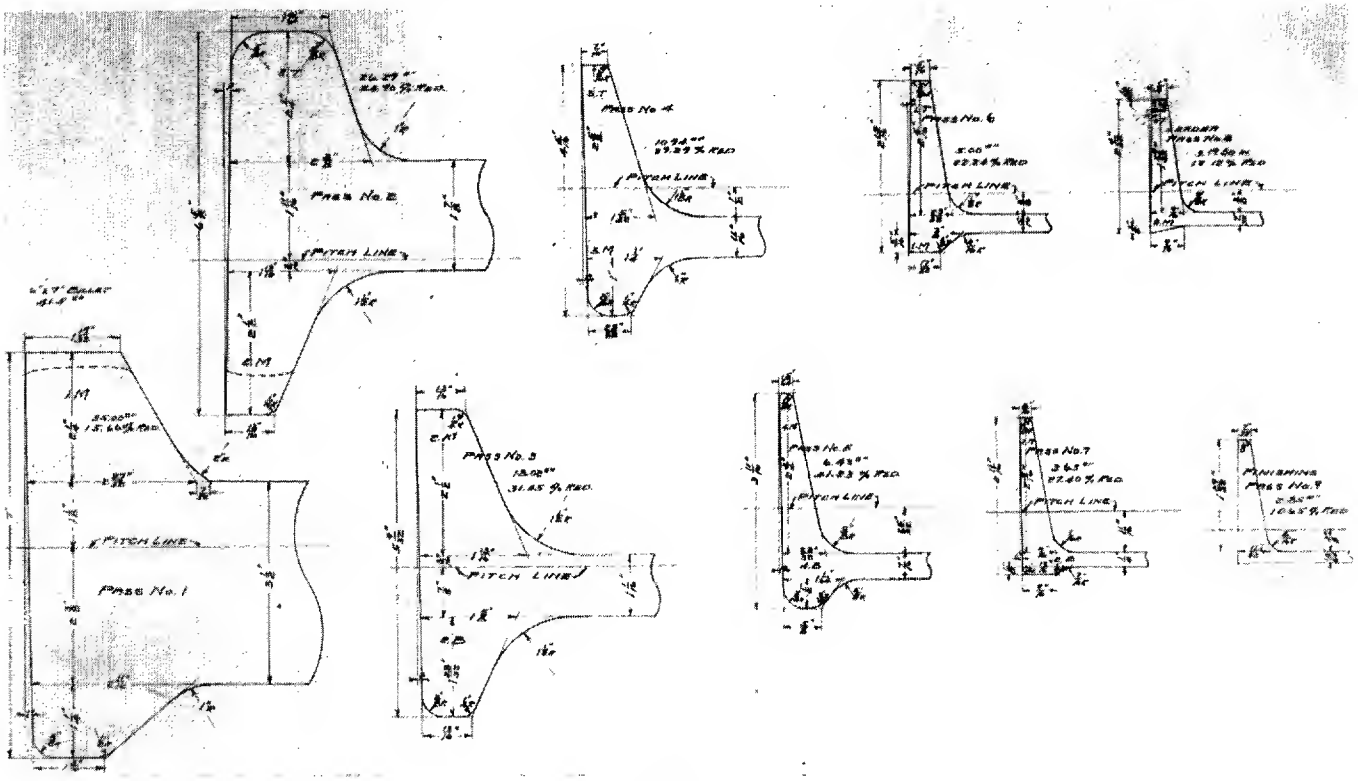


Fig. 12

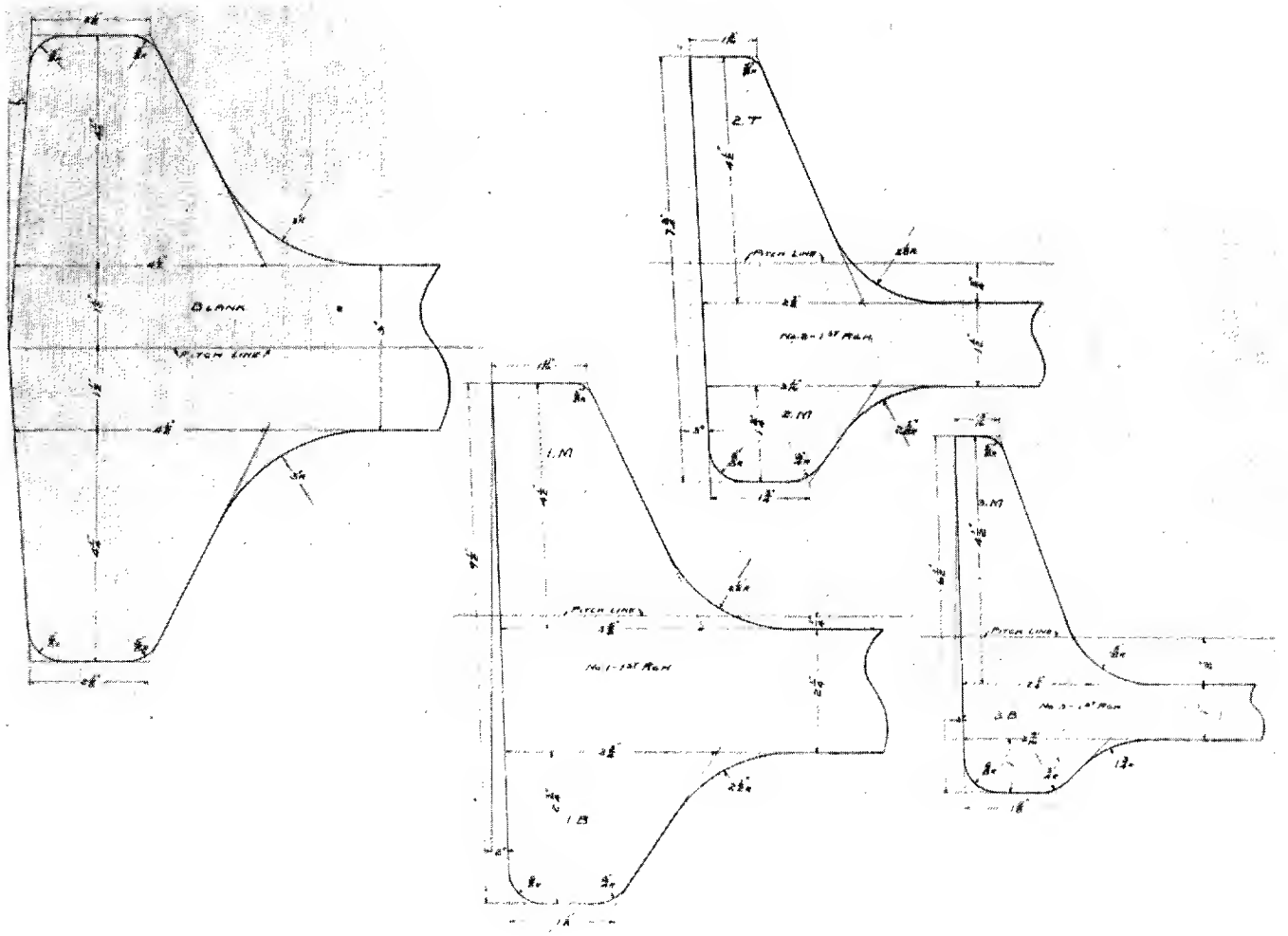


Fig. 13

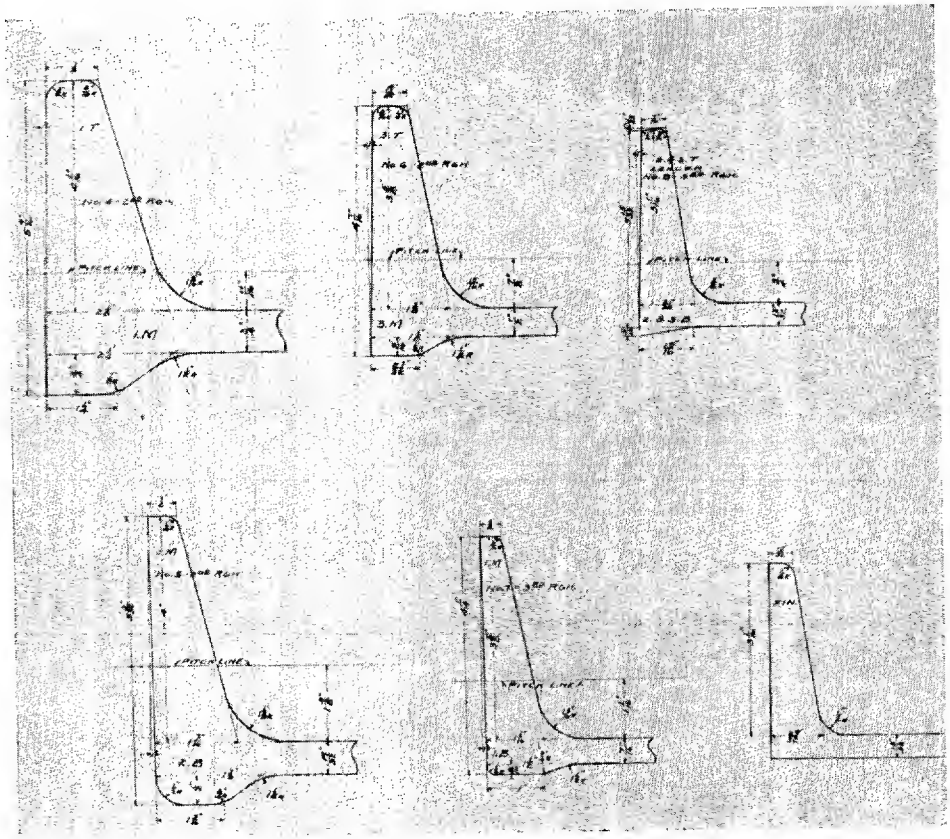


Fig. 13-A

taper is provided in the back of the flange. These tapers incline alternately in and out from the vertical, meaning that the flange is bent back and forth with each successive reduction. Thus it can be seen that in entering the bar from pass to pass, the first action that takes place in the rolling operation is the bending of the flanges. With a live flange entering a dead hole, the flange is bent and fits the dead hole, starting to compress before the web work starts.

Use of Same Breakdown Rolls

The use of the same breakdown rolls for beam and channels reduces the roll inventory required to produce both sections. If the production of the same size beam and channel can be scheduled simultaneously, some of the down time required for roll changing is eliminated.

It was noted previously that spreading is helpful in reducing side wear on the passes. However, care must be exercised in applying this feature to the design. Too little spread will naturally cause heavy side wear of the passes. On the other hand, too much spread from pass to pass is not permissible since such a condition would cause the metal from the flanges to be drawn down into the web to satisfy the excessive spread, resulting in underfilled flanges. The spreading as illustrated in Figs. 11, 11A and 11B is

Pass No.	Spread
1 to 2	$\frac{3}{16}$″
2 to 3	$\frac{3}{16}$″
3 to 4	$\frac{5}{32}$″
4 to 5	$\frac{5}{32}$″
5 to 6	⅛″
6 to 7	⅛″

From the standpoint of reduction the alternating inclination of flanges in and out from the vertical is not too desireable since such a condition makes entry from a dead pass to a live pass more difficult. This difficulty of entry is further aggravated by the necessary spreading between passes. To offset both these undersirable features, and at the same time insure the desired flange height sometimes channels are rolled with two or several live hole reductions in succession. Fig. 12 depicts this type of design. The flanges of passes #3, #4 and #5 are live. Note that with live flange reduction there is still a heavy reduction of the heel in the dead holes—23/32″ from passes #3 to #4 and ½″ from #4 to #5.

The angularity of the flange angle requires careful consideration. An inspection of Fig. 12 reveals that this angle is made greatest in the roughing passes and is gradually reduced to the finished degree as the finishing pass is approached. It is this increase in flange angle in the roughing passes that makes possible the sharp tongue or V for cutting into the bloom. It is this feature that sets up the flow of metal into the flanges so that it will not all flow into elongation. It also eliminates the possibility of torn flanges in the roughing passes.

Channels are rolled by using a beam blank. A design for a 15″ channel using this system is shown in Figs. 13 and 13A. Following the principle of successive live flange working, the first three passes reduce the flange of the beam blank rapidly, reducing the root dimension from 4½″ to 2¼″ and the toe from 2⅛″ to 29/32″. In keeping with this heavy flange work is the sizeable reduction made at the heels of the chan-

nel, 1½" in pass #1, 1" in pass #2 and ¾" in pass #3. From a comparison of sizes, 7" in Fig. 12 versus 15" in Figs. 13 and 13A, note that the change in angularity of the flange angle is not so great in Fig. 13 as in the design of Fig. 12. Contrast the design of Figs. 13 and 13A with the design of Fig. 11. Both arrangements produce the same size channel. The beam blank and first two passes of the first rougher of Fig. 13 would compare with the breakdown of Fig. 11, although in Fig. 13 the heels have been reduced more than those in the breakdown rolls. However, the first pass of the finishing mill and pass #3 of the first rougher are closely comparable, the rolls being $1\frac{3}{16}$" and 1" respectively. Seven passes are used in both cases to effect the finishing schedule.

The use of the beam blank is advantageous from a yield standpoint. A good balance between flange and web reduction is maintained which results in producing a finished bar that does not have an extended tongue at the web due to excessive elongation. This balance also keeps to a minimum the long tapering underfilled flanges. Therefore, the crop in cutting the finished bar back to full section is small, thereby increasing the yield.

Balanced draft for web and flange is just as important in designing channel passes as in designing beams. However, it is impossible to carry this balance back through the entire reduction schedule. To do so would necessitate that every channel rolled be made from a bloom which was roughly shaped to the channel dimensions. Therefore, unequal drafts should be made in the roughing passes; this, for two reasons. First, steel is hot and plastic at this point and lends itself more readily to shaping. Second, an opportunity is given to iron out any irregularities caused by non-uniform draft before the finishing pass is reached.

Timken Coats Molds With Graphite and Water

The steel and tube division of The Timken Roller Bearing Company has taken another forward step to eliminate obnoxious fumes and smoke from its steel-making operations.

The division has developed a mixture of graphite and water as a substitute for tar in coating the interiors of ingot mold into which steel is poured.

Timken adopted the graphite mixture after nine years of research and experimentation with various types of coatings, John E. Fick, Vice President in charge of the steel and tube division, announced.

Because a tar coating of the ingot mold gave an excellent surface to the ingot and prolonged the life of the mold wall, researchers had to find a coating that would not cause a loss of quality.

The new graphite coating now in full use eliminates both smoke and obnoxious gases from ingot mold operations and also maintains the necessary quality.

Mr. Fick stated that equipment costing $12,000 had to be acquired to make the change-over and that the new coating method requires 35 percent more man-hours than the old tar method.

Use of the new coating has brought a big improvement in working conditions in the steel mill and also has relieved residents in the vicinity from the obnoxious smoke resulting from the use of tar.

The problem of fumes and smoke from the tar coating of the ingot mold long has been a major one of alloy steel producers throughout the country.

Activities of Western Section Open Hearth Committee A.I.M.E.

On June 21, 1950, at Los Angeles the Western Section, A.I.M.E. Steel Committee held its regular monthly dinner meeting, preceding which the following officers were elected for the coming year: permanent chairman, George B. McMeans, Works Manager, Kaiser Steel Corporation; executive chairman, J. T. Evans, Jr., Research Laboratory National Supply Company, Torrance, Calif.; vice-chairman, Barney M. Dagan, Division Superintendent, Iron and Steel Production, Kaiser Steel Corporation; secretary-treasurer, H. R. Brookman, Vice President, United States Lime Products Corporation, Los Angeles, California.

Following past practice, with a few exceptions monthly meetings were held commencing in September, 1949, through June, 1950. The following is a brief outline of the activities of the Western Section during 1950:

January, 1950, "Stripping and Shake-Out Practice" —Carl Forkum, Columbia Steel; "Stripping and Shake-Out Practice"—J. W. Mitchell, Utility Steel Foundry.

March, 1950, "Steel Defects"—Barney M. Dagan, Kaiser Steel Corporation.

April, 1950, "Open Hearth and Electric Furnace Refractories"—Prof. James R. Cady, Mechanical Engineering Department, University of Southern California.

June, 1950, "Electric Furnace Practice at Bethlehem Pacific Coast Steel"—Ralph Price, Bethlehem Pacific Coast Steel Corp.

Will Hold Mineral Industrial Conference

Ohio, ninth among the states in mineral resources, will take stock of its assets and evaluate its future at an Ohio Mineral Industries Conference, Sept. 25-26, in Columbus. Representatives of all areas of the mineral industry in the state will be invited to attend.

The Ohio State University will join with industry and the Ohio Department of Natural Resources in sponsoring the conference, first of its kind in the state. A committee, headed by Horton H. Hampton of Cleveland, vice president, industrial development, The Nickel Plate Railroad, will handle registration and program details. Members were appointed by Dr. Howard L. Bevis, president of the Ohio State University.

Citing the mounting international crisis as a new factor in the need for such a conference, Mr. Hampton said:

"An important objective of the conference will be to acquaint the industry particularly with the research facilities available through the Ohio State University, Battelle and similar organizations and services already available through these organizations and other existing state agencies."

Forty Papers to be Presented at Meeting of Iron and Steel Engineers in Cleveland, September 26-29

THE technical program of the Association of Iron and Steel Engineers for the 1950 Convention, to be held in Cleveland Public Auditorium, September 26-29 wil be composed of thirteen separate sessions dealing with various phases of steel mill engineering, operation, and maintenance. A total of forty papers will be read during the four days of meetings, which are open to everyone attending the exposition, whether a member of AISE or not.

H. B. Jordan, president of American Steel and Wire Company, will present the main address at the General Session, September 28.

J. A. Good of Diamond Power Specialities Co. will also be featured with a paper on the role of television in the steel industry. His paper will discuss the possibilities for television in actual production operations in steel plants; not the advertising aspect of the medium. Industrial television sets will be in actual operation in the Exposition.

Another highlight of the convention will be an inspection trip to National Tube Company's recently completed plant in Lorain, Ohio.

Presenting a theme of Engineered Efficiency in Steel Plant Improvement, the Iron and Steel Exposition will show many new developments in both products and processes used by the steel industry. Unquestionably, the trend in the steel industry during the past several years has been toward increasing production through the modernization of existing process methods, and the 1950 Iron and Steel Exposition will feature equipment to improve these processes.

TUESDAY, SEPTEMBER 26

9:00 a.m.—Registration—Main Lobby

9:00 a.m.—Ladies Registration and Headquarters —Hotel Statler

9:15 a.m.—Business Meeting—Ball Room

Conducted by President A. S. Glossbrenner

9:30 a.m.—Combustion Session— Club Room B

Chairmen: Edwin C. McDonald, Combustion Engineer, Republic Steel Corp.; C. E. Duffy, Fuel Engineer, Bethlehem Steel Co.

"The Use of the Jet Mill for Combustion Purposes and for the Fine Grinding of Various Materials," by G. M. Croft, Manager, Fuel Equipment Department, Blaw Knox Co.

"Dust, Fume and Smoke Suppression," by Aubrey J. Grindle, Vice President and Consulting Engineer.

"Reduction of Hanging and Slipping in Blast Furnaces by Automatic Control," by Otto J. Leone, Engineer.

A. S. Glossbrenner, president of the Association of Iron and Steel Engineers, and vice president in charge of operations for the Youngstown Sheet and Tube Co.

9:30 a.m.—Electrical Session—Ball Room

Chairmen: J. H. Franz, Superintendent Fabricating Shops, Carnegie-Illinois Steel Corp., McDonald Works; R. J. Beeswy, Assistant Superintendent, Electric Power and Steam Department, Inland Steel Co.

"Electroplating Rectifiers," by L. W. Reinken, Chief Engineer, W. Green Electric Co.

"Preventive Maintenance of Electric Overhead Cranes," by H. C. Mullings, Assistant Superintendent Maintenance, Electric Division, Jones & Laughlin Steel Corp.

"Low Inertia D-C Motors for Rolling Mill Drives," by J. Henry Schneider, Section Engineer, D-C Machines, Elliott Co.

2:00 p.m.—Standardization Session—Ball Room

Chairmen: L. J. Gould, Chief Engineer of Construction, Bethlehem Steel Co.; Eric Anderson, Electrical Superintendent, Bethlehem Steel Co.

2:00 p.m.—Mechanical Session—Club Room B

Chairmen: J. J. Healy, Project Engineer, Armco Steel Corp.; P. L. Walter, Superintendent Mechanical Department, Republic Steel Corp.

"Rolls for Centering and Alining Materials," by E. T. Lorig, Chief-Senior Staff Engineering Bureau, Carnegie-Illinois Steel Corp.

"New Facilities for the Stocking and Shipping of Pipe at Lorain Works of National Tube Company," by C. Clarke Wales, Chief Project Engineer, National Tube Co.

"Some Aspects of Selecting and Applying Gears for Rolling Mill Equipment," by Edward C. Denne, Consultant and Manager of Gear Dept., United Engineering and Foundry Co.

WEDNESDAY, SEPTEMBER 27

9:00 a.m.—Rolling Mill Session—Club Room B

Chairmen: D. W. Lloyd, General Superintendent, Youngstown Sheet and Tube Co.; C. P. Hammond, Superintendent Rolling Mills, Rotary Electric Steel Co.

"The Design and Use of Tungsten Carbide Rolls for Cold Rolling Metals," by R. T. Beeghly, Vice President and General Manager, Metal Carbides Corp., "The Continuous Seamless Pipe Mill," by John L. Young, Vice President-Engineer, National Tube Co.

"Rolling of Tool Steels," by H. C. Bigge, Superintendent of Tool Steel Div., Bethlehem Steel Co.

9:00 a.m.—Electrical Session—Ball Room

Chairmen: K. L. Johannsen, Superintendent, Assigned and Operating Maintenance, Carnegie-Illinois Steel Corp.; R. W. Graham, Superintendent Electrical Department, Bethlehem Steel Co.

"Transformer Oils in the Steel Plant," by John F. Boal, Lubrication Engineer, Carnegie-Illinois Steel Corp.

"Requirements for a Modern Steel Mill Distribution System," by F. H. Wickline, Construction Electrical Engineer, National Tube Co.

"Grounding Practice of the Inland Steel Company," by V. E. Schlossberg, Superintendent Electric Power and Steam Departments, Inland Steel Co.

1:00 p.m.—Inspection Trip—National Tube Company, Lorain, Ohio

THURSDAY, SEPTEMBER 28

9:00 a.m.—Training Session—Ball Room

Chairmen: I. N. Tull, Electrical Superintendent, Republic Steel Corp.; John H. Vohr, General Superintendent, Carnegie-Illinois Steel Corp., Gary Works.

"Supervisory Development," by A. C. Croft, President, National Foreman's Institute, Inc.

"The Bethlehem Loop Course," by H. C. Houghton, Assistant to Manager of Personnel, Bethlehem Steel Co.

"Motor Inspection Training Program," by George Kennedy, Carnegie-Illinois Steel Corp.

9:00 a.m.—Lubrication Session—Club Room A

Chairmen: W. M. Schuck, Lubrication Engineer, Armco Steel Corp.; R. A. Kraus, General Mechanical Foreman, Republic Steel Corp.

"What to Look for in Hydraulic Fluids," by Anthony J. Zino, Jr., Assistant Sales Manager, Industrial Division, Swan-Finch Oil Corp.

"Rolling Solutions for Specialty Steels," by Maxwell L. Bible, General Foreman, Cold Reduction Div., Crucible Steel Company of America.

"Metal Drawing Lubricants for Wire, Tubing and Sheet Steel," by Walter A. Smigel, General Manager and H. Grey Verner, Ph.D., Director of Research, R. H. Miller Co., Inc.

9:00 a.m.—Combustion Session—Club Room B

Chairmen: R. A. Lambert, Superintendent, Steam and Combustion, Jones & Laughlin Steel Corp.; E. T. W. Bailey, Chief Combustion Engineer, Steel Company of Canada, Ltd., Hamilton.

"The Public Demands Better Combustion," by L. T. White, Director, Business Research, Cities Service Oil Co.

""The Application of the Heat Prover to the Steel Industry," by Joe G. Sparks, Cities Service Oil Co.

"Economics of a 500-Ton Open Hearth Furnace," by Walter W. Kompart, Combustion and Hydraulic Engineer, Weirton Steel Co.

"Oxygen for the Open Hearth—Its Storage and Distribution," by R. Tietig, Jr., Engineer and B. P. Carasin, Engineer, A. J. Boynton & Co.

2:00 p.m.—General Session—Ball Room

Chairmen: A. S. Glossbrenner, Vice-President Operations, Youngstown Sheet and Tube Co.

An address by H. B. Jordan, President, American Steel and Wire Co.

"Engineering and Purchase," by Thomas D. Jolly, Vice President—Engineering and Purchases, Aluminum Company of America.

"Proposed New England Steel Plant," by Clifford S. Strike, President, F. H. McGraw & Co.

FRIDAY SEPTEMBER 29

9:00 a.m.—Operating Practice Session—Club Room B

Chairmen: W. H. Collison, Superintendent of Coke Plant, Great Lakes Steel Corp., Ecorse; Paul E. Thomas, Assistant to General Supt., Carnegie-Illinois Steel Corp.

"Density Control of Coal Charged in Coke Ovens," by C. W. Stahl, Engineer, Coal and Coke Chemical Research, Bethlehem Steel Co., and J. K. Kurtz, Coke Oven Superintendent, Bethlehem Steel Co.

"The Use of a Fuel Oil as an Absorption Oil in Recovery of Light Oil from Coke Oven Gas," by C. R. Montgomery, Chief Chemist, By-Products Coke Dept., Pittsburgh Steel Co.

"Blast Furnace Hearth Cooling," by Owen R. Rice, Freyn Engineering Co.

9:00 a.m.—Electrical Session— Ball Room

Chairmen: W. J. Tunny, Superintendent Electrical Maintenance, Youngstown Sheet and Tube Co.; J. D. O'Roark, Electrical Superintendent, Weirton Steel Co.

"Temper Rolling with Modern Control," by J. F. Sellers, Engineer-in-Charge D-C Design, R. M. Peeples, Engineer and A. C. Halter, Engineer, Control Section, Engineering Department, Allis-Chalmers Manufacturing Co.

"Temper Mill Power Requirements," by Wm. P. Smith, Industrial Engineer Division, General Electric Co., Schenectady, N. Y., and J. E. Butler, Electrical Engineer, Weirton Steel Co.

"Acceleration Characteristics of Tandem Cold Reduction Mills," by W. R. Harris, Manager, Metal Working Section, Industry Engineering Department and R. W. Moore, Steel Mill Engineer, Industry Engineering Dept. Westinghouse Electric Corp.

2:00 p.m.—Lubrication Session—Club Room B

Chairmen: D. E. Whitehead, General Lubrication Engineer, Crucible Steel Co. of America; N. I.

(Continued on Page 1095)

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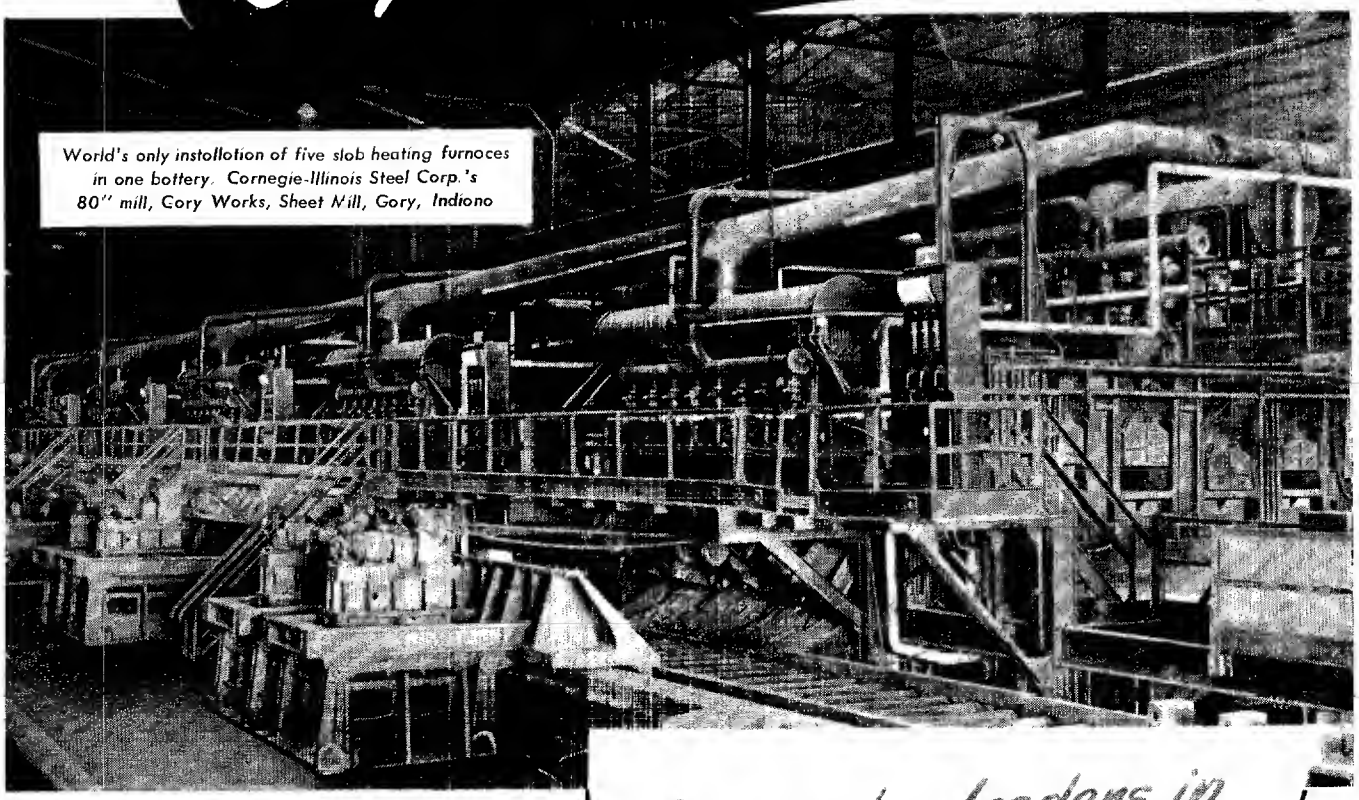

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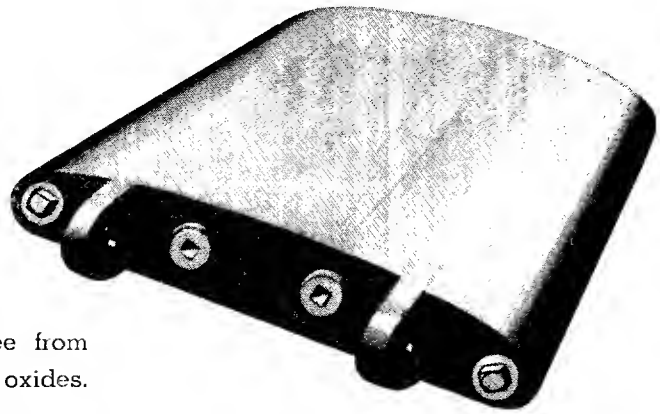

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My Own Page DON N. WATKINS, Publisher

STEEL MILL CHATTER

Was pleased to learn on my return from abroad that one of my old time friends, Cord Snyder, has been named president of the Freyn Engineering Co., and that another of my friends, Gordon Fox, has been appointed executive vice president. Both Cord and Gordon have had years of experience in steel plant design and equipment. Gordon has been a member of the Freyn organization since 1920, before which he was with General Electric and the former Steel & Tube Company. . . . I was glad to have the opportunity to attend the Annual Golf Tournament of the Blast Furnace and Coke Association of the Chicago District on August 4. The Association always puts on a fine party and I can meet many of my friends there. Both the Eastern States and Chicago District Associations are fine organizations, and have done a lot to create an excellent spirit of fellowship among their members. I am pleased to be a member of both associations. Jim Stapleton is to be congratulated on the success of his first meeting as president of the Association. Some of those I saw were: George Abel Hjalmar Johnson, Chubb Rich, Fred Gillies, Pete Miller, Heb Lauer, Pat Cromwell, Tiny McMahan, Paul Nichols, Ted. Plimpton, Roy Lindgren, Gordon Fox, Bud White, and Arthur Whitcomb. . . . Leonid Umansky, who is one of the leading authorities on steel plant electrification and who is widely known throughout the steel industry has been advanced by General Electric to the post of manager of engineering of the industrial engineering divisions. . . . Another appointment that pleased me was that of Jim Stapleton who has been advanced to assistant to vice president—blast furnaces Carnegie-Illinois Steel Corporation. Jim has been division superintendent of blast furnaces at South Works, but he will now be located in Pittsburgh. He is one of our top blast furnace operators, and his promotion is well deserved. . . . Jay Martin, vice president of operations, Colorado Fuel and Iron Corporation, and a long time friend of mine, has announced that Vic Johnson will be in full charge of the Corporation's new $5,000,000 rod mill at Pueblo. I visited this rod mill soon after it had been placed in operation, and it certainly is one of the finest in this country. . . . I see that my friend George McMeans, Works Manager, is again breaking records out at Fontana. In July five records were made. George as well as all of his co-workers, are to be congratulated upon the record-breaking progress that is being maintained at his plant. . . . In all my trips through the west I am impressed with the fact that all of the western plants under very capable management are expanding and increasing production at a record breaking rate. Well, the west has always been noted for spirit and action. . . . In regard to increased capacity, I notice from a report I have just received from the American Iron and Steel Institute that on July 1 the steel industry's capacity for the first time in history passed the 100,000,000-ton mark. The present capacity is 100,563,500 tons of ingots and steel for castings. By the end of 1952 a further increase of 5,000,000 tons will be made. . . . Walter Munford, vice-president-operations American Steel and Wire Company has just notified me of the appointment of Harry Jenter as chief engineer of the Company. My friends Harvey Jordan, president, and Walter are doing a fine job for Steel and Wire. . . . Under the leadership of Pete Mauthe as president, the Youngstown Sheet and Tube has built up a fine operating organization. The latest promotion is that of Tom Cleary who now is general superintendent of the Campbell Works steel plant and Struthers Works. Tom, who started out the hard way as a laborer in the plant, succeeds Bill Yeckley. Tom and I were members of the Executive Board of the National Open Hearth Committee. . . . Just received a note from Jack Ashley, vice president and general manager of Kaiser Steel Corporation. Jack tells me of the appointment of Atwood Austin as vice president and treasurer of the Corporation and of C. F. Borden as vice president in charge of sales. The latter was formerly with Columbia Steel and Geneva Steel Corporation. . . . I was pleased to receive an invitation to attend the inauguration of the fourth president of Carnegie Institute of Technology on October 27-28. John Christian Warner succeeds Robert E. Doherty who has been president since 1936. I have always had a high regard for Carnegie Tech as many of its alumni have been prominent in the steel and associated industries. One of the most prominent is Charles E. Wilson president of General Motors Corporation. Others are: Leo Reinartz, Guy Wehr, Jim Lose, Tom Plante, Lee Pringle, Newell Orr, Art Weibel, Maxwell Gensamer, besides a great many others. . . . I was sorry to read of the death of another of my friends William Franklin Ditwiler, formerly president and later chairman of the board of the Allegheny Ludlum Steel Corporation. He started with the company as an electrician back in the early days of the company's history when Harry Sheldon was president, and when the going was really tough.

Don N. Watkins

THE POWER PLANT

The boiler house is steel frame, with concrete substructure resting on concrete piles. Steam and coke oven gas lines are carried high above the tracks.

Making the Most of a Waste Fuel

Boilers of Alan Wood Steel Co. burn blast furnace gas, coke oven gas, tar or oil, separately or in combination.

by Samuel Blum
Chief Engineer, H. W. Wilson Co., Philadelphia

THE conditions encountered when approaching the problem of power and steam at the Alan Wood Steel Company Plant were indeed unique; made so by an historic development from separate entities originating on opposite sides of the Schuylkill River and occupying appreciable geographic areas on each side. On the west side are located the blast furnaces, sinter plant and coke plant; on the east side are the open hearth furnaces, the blooming mill, the steel mills, the new strip mill and the administration buildings. Uniting these groups across the river and the main tracks of the Reading and Pennsylvania Railroads on each side of same; is a Company bridge over which is shuttled the "bottles" of molten metal; and over which is carried the coke oven gas main and the recently completed mile-long high pressure steam line.

Historic Background:

The history of this industry, dating back as it does to Revolutionary Times, is a saga of American enterprise.

It was in 1792, that James Wood, the first of that family to engage in the iron business, established a "smithy" near Hickorytown, Penna. Prior to 1805, he worked a tilt-hammer forge at "Hammer Hollow", located near the place now known as Strafford, on the Pennsylvania Railroad and so named because hammers were the leading product.

This was followed in 1808 with a forge at Pennypack Creek and ten years later he joined with several others to take over the historic "Valley Forge", a mill originating in 1742 which gave its name to that outstanding landmark of the Revolution. This was the first important crucible steel enterprise in America but was soon abandoned.

Mr. Wood then returned to the Pennypack and later turned his attention to the State of Delaware where in 1826, he and his son Alan, leased a small water mill about five miles northwest from Wilmington known as The Delaware Iron Works. Here,

American, Swedish, Russian and English bars were rolled into sheet iron until 1832, when the business was moved to Conshohoeken on the banks of the Schuylkill.

Operating as James Wood & Son, this mill, with 18″ diameter x 36″ rolls, one grate furnace and a 16 foot diameter water wheel to which the sheet mill coupled directly, was the starting point of the industry now straddling the river. The capacity was 54 sheets in 12 hours.

From 1832 on, the subsequent history of the Conshohocken establishments is a record of frequent change and continual expansion under varying arrangements of the family name for five generations, culminating in 1901 as the Alan Wood Iron & Steel Company. It was at this time that the Ivy Rock Open Hearth Plant was started; producing its first steel in 1903.

Other kindred industries, founded and developed in the vicinity on both sides of the river, soon realized the advantage of combined operation and were taken over by the Corporation to form the existing group.

There was the Schuylkill Iron Works, started in 1857 by Alan Wood, son of the founder and brother-in-law Lewis A. Lukens, and continuing until 1903 when it joined the Corporation.

There was the Swedeland blast furnace plant on the west side of the river, founded in 1849 and owned and operated by Heckscher & Sons from 1866 until 1911 when it was absorbed into the Corporation. The bridge making possible the transfer of hot metal to the east side was built in 1910.

In 1918, the Rainey-Wood Coke Company Plant was built, located just north of the blast furnaces at Swedeland. This was operated jointly by the Rainey Estate and the Company until recently. In 1918, the new five story administration building and machine shops were also completed.

In 1929, a complete re-incorporation took place as The Alan Wood Steel Company with each plant now designated as a division of that Company. Today, with the completion of the new strip mill and steam plant; the four divisions operating in this area embrace every phase in the production of steel and iron from the raw ore and coal to high quality finished sheets, plates, strips, cut nails and clad steel.

Old Steam Plants:

At the time this project was inaugurated, each unit had its own steam plant. At the steel mill, twelve 250 H. P. boilers were fired with oil and coke oven gas at the open hearths, three boilers produced steam on available waste heat. These were the only plants connected by a steam tie line.

The steam plant at the blast furnaces provided steam at 155#, 450° TT, for blowers and for two condensing turbo-generators which produced about 45% of all current requirements.

The blast furnace boiler plant consisted of twelve B&W, long drum, straight tube boilers, each rated 600 H. P. Five were fired with natural draft burners while seven were provided with Steinbart burners which serve to mix the gas and air prior to firing. All burners were equipped to burn tar and fuel oil. The efficiency when burning blast furnace gas varied from 56% to 67%, equivalent to a burning rate of 20.3 to 17 C.F. of 93 BTU/CF gas per lb. of steam.

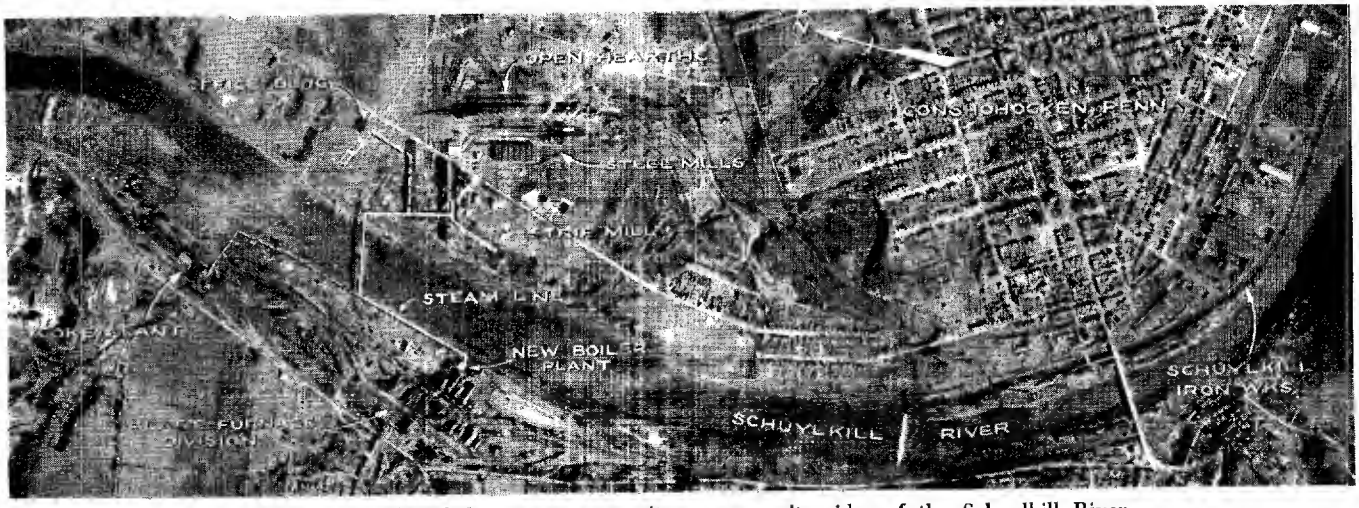
New Comprehensive Plan:

As the first step in a comprehensive program for making the most efficient use of all available blast furnace gas, it was decided to install two modern boilers adjacent the existing plant, and provide a steam line along both banks and across the Schuylkill River about one mile long, connecting to the steel mill, and incidentally with the boiler plant at the open hearths. Since installing this pipe line, the steel mill boiler plant has been dismantled.

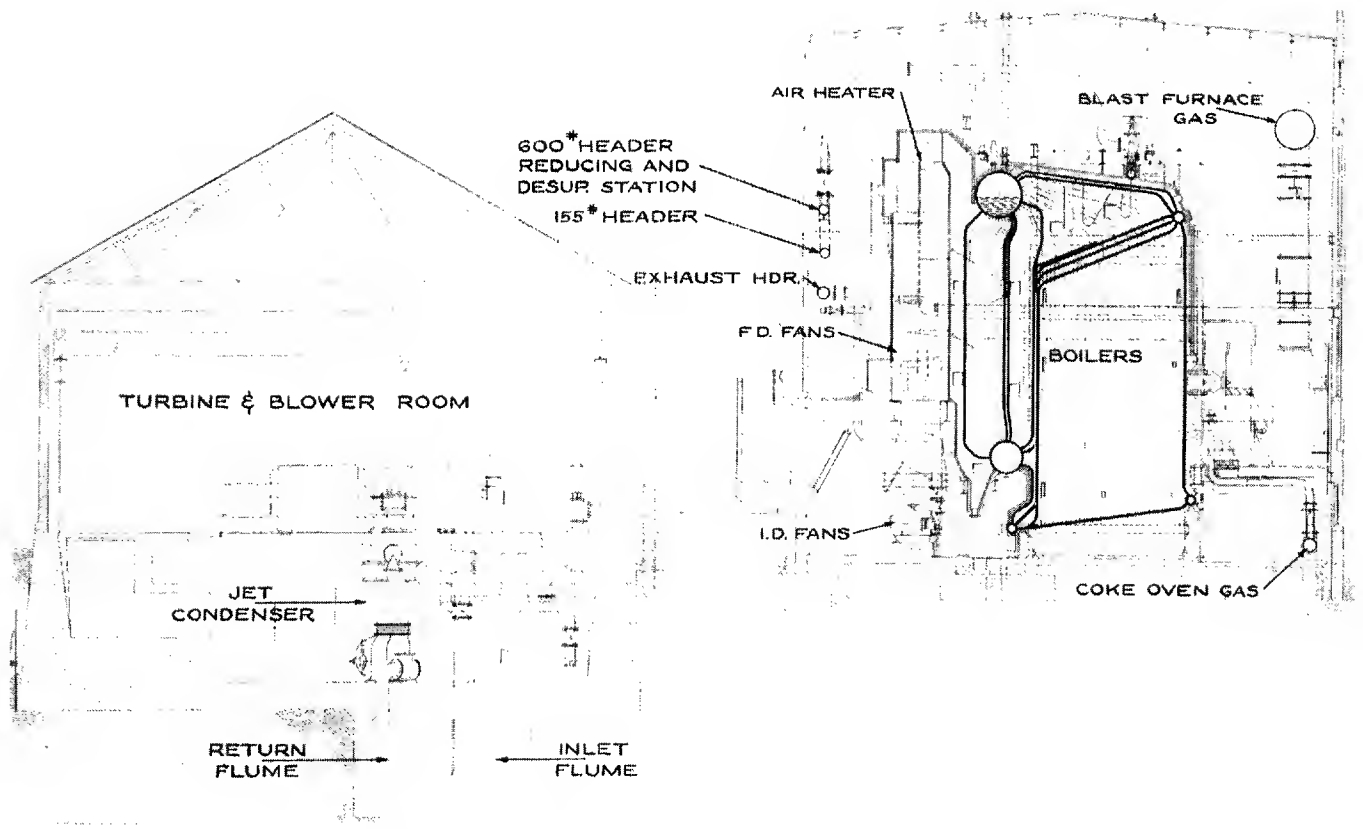
The new boilers now operate at 165# - 507° TT, but are designed for 610# - 725° TT, thus anticipating future turbine replacements or additions.

Gas Cleanliness A Decided Advantage:

The old boilers operated at moderate ratings, and gas cleanliness was not too important. Gas from each of two blast furnaces was cleaned by being passed through a large cyclone dust catcher as the first effect; through four smaller cyclone dust catchers operating in parallel as the second effect; and then through a Feld wet scrubber.



The plant developed from separate entites on opposite sides of the Schuylkill River.



Section through boiler house and existing turbine and blower room.

The results in grains per cubic foot averaged as follows:—

Dry Separation	— in 11.2	— out 3.0
Wet Separation	— in 3.0	— out 0.2
Dust Remaining	— as fired	— 0.2

In anticipation of the new boilers, operating at higher ratings, with more torturous gas passes and an air heater; electrical precipitation was added for that portion of the gas used by the boilers.

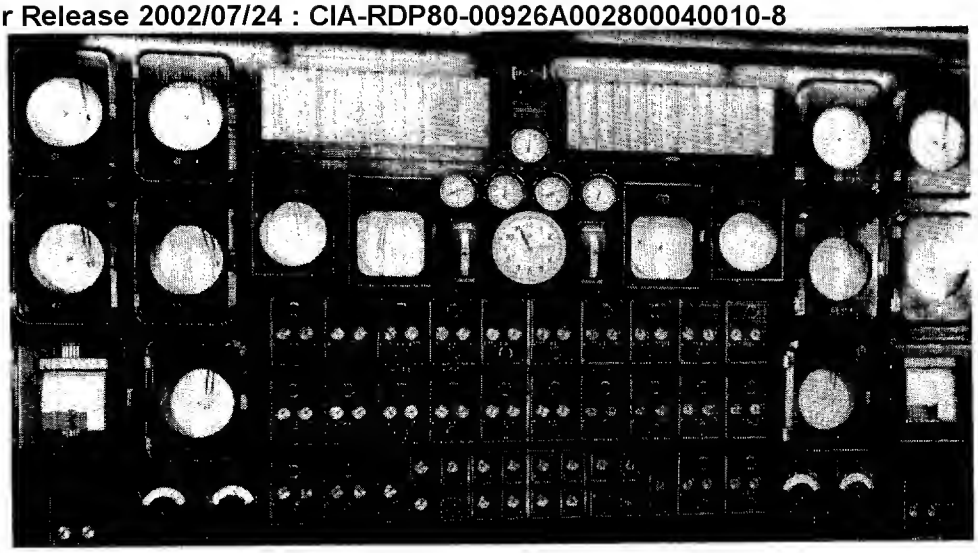
Gas now leaves the top of the furnaces and passes through an upright brick-lined cyclone, where; due to change in direction of the gas flow and a resultant drop in velocity and pressure, the greater portion of the suspended dust is precipitated. It then passes through the four smaller cyclone dust catchers operating in parallel, and on through a gas washer. This washer is a re-converted Bartlett & Hayward washer, containing five tiers of rotating cones and screens, and one bank of tiles. Water enters at the top through a series of sprays flushing the tiles, and flows down over the revolving screens which throw the water out against the washer sides. The dust in the gas which is passing upward, is caught in this water and is carried out the bottom as a sludge which is pumped to a Dorr thickener. About 1200 GPM of water is required.

Of the gas leaving the washer; 30% is used as is in the stoves. The remaining 70% is passed through the Cottrell electrical precipitator to the boilers. This precipitator is divided into two units by a double wall, each half containing 176 tubes. Down the center of each tube hangs a prong type discharge electrode. The gas passes up through these tubes and out the top. The electrical charge (75,000 volts), passing through the discharge electrodes repels the dust particles which are attracted onto the tubes. A constant flow of water washes the surface of the tubes carrying the dust out the bottom to the Dorr thickener.

The gas conditions at the various stages is about as follows:—

	Pressure In	Pressure out	Temperature out	Grains C.F. in	Grains C.F. out
Dry separator	30	23	350-550	11.2	3.0
Wet separator	23	7	60-70	3.0	.2
Electric preeip.	16	14	60-70	.2	.010 to .005
As fired		13.5	60-70	.010 to .005	

The decided advantage of this very clean gas is reflected in trouble free operation. Numerous lance and cleanout doors were provided to permit easy access for cleaning every part of the boiler, but these are seldom if ever used. Provision was also made for soot blowers though these were not installed at this time. Nor have they been found necessary after almost one year of operation, for with the clean gas supplied, cleanliness of boiler surfaces and burners has proven no problem at all.



All instruments and the combustion control are mounted on one large board.

New Boilers:

The two new boilers are designed for 610# pressure, 725° tt, though at present they are operating at 165# pressure, 507° tt. Each unit is rated for 125,000#/hour continuously but is capable of produeing 150,000#/hr. for two hour peaks.

The heating surfaces are proportioned as follows: boiler 18,440 sq. ft., water walls 3,100 sq. ft., superheater 745 sq. ft., and air preheater 24,000 sq. ft. The furnace volume is 10,000 cu. ft.

The boilers are entirely encased in a heavily reinforced steel casing designed to withstand internal pressures as high as 100 lbs./sq. ft. This was considered very desirable because oecasional furnace puffs or even slight explosions may be anticipated in lighting off dissimilar fuels, or while changing from one fuel to the other. Four large explosion doors are also provided in each furnace roof.

The furnace design is very liberal, the heat liberation at maximum rating is about 22,000 BTU/CF of furnace volume thus assuring natural flame development in the furnace and complete combustion of the slow burning blast furnace gas before the tube passes are reaehed. The furnaee floor is protected by a widely spaced water tube sereen but this was provided primarily for absorption and circulation and not in anticipation of ash difficulties. The floor has never needed cleaning.

Three burners are provided for each boiler. The two lower burners are designed to burn either blast furnace gas or coke oven gas as the principle fuels, with oil or tar as supplementary fuels. Full capacity can however be developed with fuel oil or tar.

The third burner, which is placed approximately six feet higher, is arranged for coke oven gas and oil only and is used as an auxiliary when; due to blast furnace outage; there is a shortage of blast furnace gas.

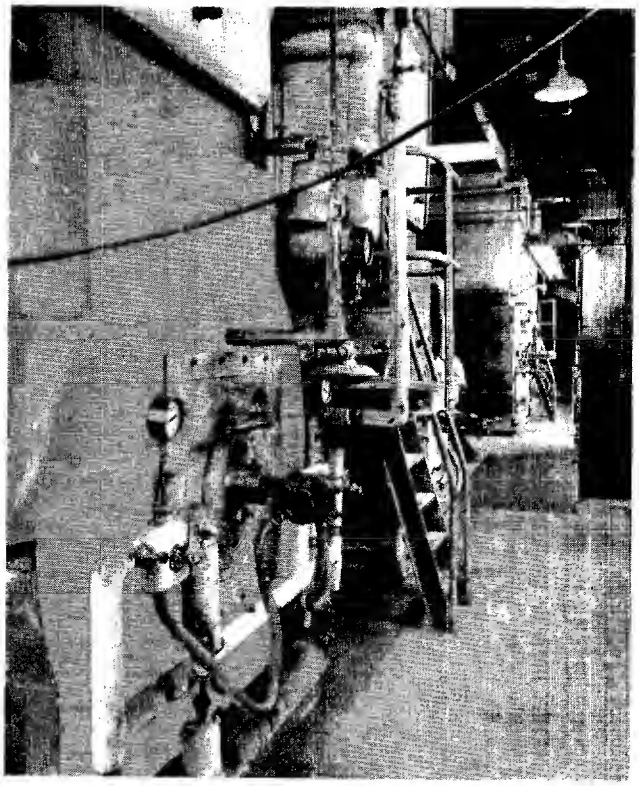
The blast furnace gas burners are plaeed farther away from the furnace exit to allow for the greater time required for the complete combustion of this gas as compared with that of oil and coke oven gas. The greater weight of the products of combustion of blast furnace gas passing over the superheater makes it desirable that these burners be farther away from the superheater than the burners for oil and coke oven gas. With this disposition of burners it is possible to obtain uniform steam temperatures while burning any one of the fuels either separately or in combination.

Access doors and perforated steam rings were provided to aid in cleaning the burners, but the burners have remained free of deposits at all times.

Operation to date has proven most gratifying. The equipment has not only come up to Manufacturers' predictions, but has been marked by almost complete freedom from the cleaning problems usually associated with the burning of blast furnace gas. Coke oven gas and tar have not yet been used though the equipment is set up for these fuels also.

A comparison of performance with Manufacturer's predictions shows the following:—

	BLAST FURNACE GAS		FUEL OIL	
	Contract Prediction	Test Performance	Contract Prediction	Performance Test
Steam—#/Hour	125,000	124,700	125,000	128,200
Steam Pressure	165	163	165	163
Steam Temperature	500	501	488	470
CO_2—Exit Gas	23	22.6	13.5	12.7
Exit Gas Temperature	440	445	340	292
Air Temp. Entering Htr.	80	80.4	80	88
Air. Temp. Leaving Htr.	550	556	410	377
Draft Loss Thru Boiler	2.15	1.44	.7	.46
Draft Loss Thru Air Htr.	2.25	.65	.75	.29
Pressure Drop—Superhtr.	7.	9.	7.	8.
Efficiency—Complete Unit	82.8	82.8	85.4	87.5
C.F. of 92 BTU/LB Steam		14.4		



Burners fire blast furnace gas, coke oven gas, tar or oil; separately or in combination.

Combustion Control:

The combustion control is of the "metering" type air operated, and arranged to function on the two lower burners only; with either blast furnace gas or coke oven gas as the pimary fuels; and oil or tar as the seeondary fuel.

It responds very satisfactorily under all conditions. The oil flame comes on smoothly from zero flow when the blast furnaee gas pressure drops; without any puff or explosion. Even with severe instanees of operation when plant load dropped 50,000#, one boiler which was base loaded held steady, while the other took the drop without any appreeiable ehange in pressure, and then pieked up 90,000# on full automatic eontrol.

The control embodies every known feature available for the effieient as well as safe operation of combustion equipment with a eomplex fuel supply. These features inelude eorreet sequence for starting, safety trips and warnings in event of failure of draft, air, fuel supplies, or pilot flames, the automatic ehange from gas to oil and reverse, and the maintenance of predetermined furnaee pressures and correet fuel-air ratios under all eonditions.

Since the use of oil occurs only for very short periods at one to two hour intervals when the gas pressure drops, it was important that the oil be kept hot and fluid in the lines right up to the burners at all times. This was accomplished by the use of a copper steam tracer line, wired to the oil piping and encased in the insulation.

Another detail whieh required speeial attention was the pilot flame and alarm. The original pilot flames, fed from the eoke oven gas supply at a varying pressure of 1 to 4 lbs., consumed about 5000 CFH per burner, and produced long lazy flames which were deflected from the flame rod with every change of air supply. Nor were these flames dependable as pilot lights. By the introduction of an inspirator using compressed air; the air and gas are mixed externally resulting in dependable strong hot flames close to the pilot tips which cannot be deflected away from the flame rod detector. Less than one-tenth of the coke oven gas is now used.

Meters and Instruments:

Instrumentation for this plant is most complete, all being mounted with the combustion control on one large board serving both boilers.

Flowmeters are provided to record:—steam from each boiler and to auxiliaries and distribution; feedwater to all boilers; blast furnaee gas to each burner, two per boiler; coke oven gas to each boiler and separately for pilots; and fuel oil to each boiler.

Each boiler is provided with a thirteen point draft record the temperatures of air and flue gas entering and leaving air heater, superheated steam, blast furnace gas, coke oven gas, fuel oil and feedwater.

Each boiler is provided with a thirteen point draft gauge indicating pressures for b. f. gas in main and burners; coke oven gas in main and burners; furnaee; air pressure entering and leaving air heater and at burners; and draft entering and leaving air heater.

Recorders are also provided for boiler water level, and for steam, feedwater, blast furnaee and coke oven gas pressures. Tachometers show the speed of forced and induced draft fans.

Auxiliaries, Steam Driven:

To provide exhaust for heating feedwater and to obtain assured continuity of service, all fans and pumps are steam driven from the 155 lb. system. This 155# source will in the future, be extracted from the new turbines.

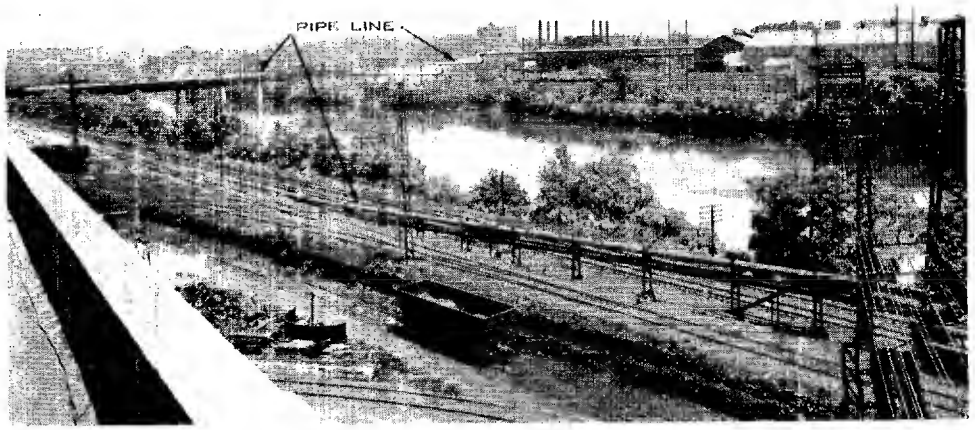
Each boiler is provided with individual induced and forced draft fans, driven through reduction gears. The induced draft fans discharge into existing steel stacks, two of the old stacks serving one boiler. A detail often overlooked when burning blast furnace gas is the relatively large volume of products of combustion. A very liberal design of fans has in this case paid off well in ease of operation and control.

Four turbine driven boiler feed pumps serve both the new and old boilers.

Feedwater Treatment:

Only about ten percent of the steam output of this plant is returned as exhaust or condensate, since most of the steam is now used by the turbo-generators and turbo blowers having jet condensers; or is sent across the river to points so remote that returns are economically impractical. An assured and ample supply of treated feedwater is therefor very vital.

This water is obtained from the Schuylkill River. It averages 8.5 GPG of hardness and is relatively turbid. It is pumped to a 35'-0" diameter x 19'-0" accelator retention tank under automatic rate-of-flow control. Lime and alum are fed to the accelator by means of four dry chemical feeders with dissolving tanks, agitators and slurry pumps. Sludge is blown automatically and intermittenly. Effluent turbidity



A steam line about one mile long conveys steam along both banks and across the river from the boiler house to the steel mill.

is held to within 6 ppm with raw water up to 1000 ppm.

From the accelator it flows to a 100,000 gallon surge tank. From this tank, part is used for the precipitator and the balance continues to any two, of three 13'-0" diameter wood gravity filters and then through flow controllers to a 400,000 gallon clearwell for boiler feed use.

From the clearwell, water is pumped through a battery of three 10'-0" diameter Zeolite water softeners, direct to a de-aerating feedwater heater. Excess softened water is stored under float control in a 150,000 gallon wood tank which formerly served as a clarifier. This tank and the clearwell make available an emergency reserve for about ten hours of heavy operation.

The system provides clear, soft, and oxygen-free water to the boilers at 220°, and a continuous blowdown system maintains concentrations within limits which assure steam purity.

Pipe Line:

Several unique features mark the design of the mile-long pipe line connecting the two sides of the river. This line is supported its entire length from below so that in no instance is the weatherproof covering pierced in the upper half. Rollers and anchors are designed to assure free but guided expansion. Along the west river bank and across the bridge, stainless steel corrugated expansion joints were used. Along the east side, large graceful bends were provided. An 18° coke oven gas line parallels the 12" steam line along the west bank and the supports for both are mounted on concrete pilings.

Design and Construction:

The entire project was designed by and constructed under the direct supervision of the H. M. Wilson Company, Engineers and Constructors, of Philadelphia, Pa. The various studies were developed in cooperation with the Alan Wood Steel Company's engineering and operating personnel whose well kept records of operation and cost were of inestimable value.

PRINCIPAL POWER PLANT EQUIPMENT
H. M. WILSON COMPANY—ENGINEERS & CONSTRUCTORS

Boilers & Water Cooled Furnaces ..... Riley Stoker Corporation
Two—2 Drum Bent Tube, Each 125,000# per hour continuous, 150,000# per hour for 2 hours. 610# - 725° F. TT Design. 155# - 500° F. TT present operation.
Boiler 18,440 Sq. Ft., Water Walls 3100 Sq. Ft.

Superheater—745 Sq. Ft. ..... Riley Stoker Corporation
Air Preheater—24,000 Sq. Ft. Straight Tube Riley Stoker Corporation
Burners ..... Peabody
Three per boiler, Combination B.F. gas, coke oven gas, fuel oil, or tar.
Burner Pilots ..... North American Mfg. Co.
Coke oven gas and compressed air.
Water Columns ..... Yarnall-Waring Co.
Blowoff Valves ..... Yarnall-Waring Company
Stacks - Steel ..... Existing

BLAST FURNACE—11

Breechings, Gas & Air Ducts ..... Philadelphia Iron Works
Safety Valves ..... Consolidated Ashcroft
Non-Return Valves ..... Edwards Valves, Inc.
Fuel Oil Storage Tank—300,000 Gals.—Re-Located ... Existing
Fuel Oil Storage Tank Fittings ..... Johnson & Jennings Co.
Fuel Oil Pump—7½ x 6 x 10 Duplex ... Union Steam Pump Co.
Fuel Oil Heater ..... Griscom-Russell Co.
Foamite Equipment ..... Foamite Corp.
Forced Draft Fans—Two—D.I.D.W. ... American Blower Corp.
50,000 CFM—13" S.P. 1655 RPM. 143BHP.
F. D. Fan Drive Turbines ..... Elliot Company
175 BHP—4480/1655 RPM Reduction Gears
155# - 500° TT/5# Back Pressure
I. D. Draft Fans—Two D. I. 2/3 D. W. American Blower Corp.
193,000 CFM - 600° F, 13" S.P.
840 RPM, 587 BHP.
I. D. Fan Drive Turbines ..... Elliot Co.
600 BHP—4400/840 RPM Reduction Gears
155# 500° TT/5# Back Pressure.
Boiler Feed Pump ..... Dravo Corp.
2 Stage Centrifugal 840 GPM,
575 Ft. Head, 161 B.H.P.
B. F. Pump Drive Turbine ..... Elliot Co.
175 BHP - 2250 RPM
150# - 100° S/5# Back Pressure.
Feedwater Regulators—(Copes) ..... Northern Equipment Co.
Air Compressor ..... Worthington
8 x 9 Single Horizontal - Carbon Ring
25 HP - 1800 RPM, V-Belt Drive.
Combustion Control—(Air Operated) ..... Hagan Corp.
Flow Meters ..... Hagan Corp.
Water Level Recorders ..... Hagan Corp.
Draft Gauges—Two—13 Point ..... Hays Corp.
Potentiometers—Two—8 Point ..... Leads & Northrup
Pressure Recorders ..... Bristol
Pressure Gauges—(Helicoid) ..... American Chain & Cable Co.
Tachometers ..... Weston
Water Treating Equipment ..... Infileo
Feedwater Heater ..... Cochrane Corp.
Continuous Blowdown ..... Cochrane Corp.
Blast Furnace Gas Stop Valves—(36") ..... Chapman
Gas Control Valves—Linatex Butterfly ..... Freyn Engrg. Co.
Expansion Joints ..... Zallea Bros.
Piping Contractor ..... Nelson Co.
Pipe & Equipment Insulation Achenback & Butler and Philip Carey Co.
Valves ..... Crane Co.
Electrical Precipitator ..... Research Corp.

Continental Foundry & Machine Company Adds Welding Department

FOR the first time in its 40-odd year history, Continental Foundry & Machine has entered commercial welding as an adjunct to its steel foundry production and manufacture of complete rolling mills, heavy machinery and iron and steel rolls.

The building housing the new division at East Chicago is one purchased less than a year ago as war surplus and was previously a cast armor plant operated by Continental throughout the war on ground adjacent to their East Chicago plant. The main purpose of the plant now is for the production of fabricated steel and composite steel casting, and steel plate structures to effect economies in both weight and cost of intricate assemblies.

The addition of weldments to the firm's operations will in no way limit its production of steel castings but will improve its competitive position by permitting production of assemblies by the most efficient method—either steel castings, steel pipe fabrications, or composite assemblies—for commercial customers as well as its own product components.

The complete steel fabricating, welding and machining facilities open up new markets to the firm including formed and welded units for the chemical and refining industry, electrical industry, certain machinery and heavy equipment industries and others not formerly served to any large extent. Continental is in a unique position to serve a wide variety of industries because its facilities include a complete engineering department, three complete steel foundries, a steel fabricating and welding division and one of the most comprehensive groups of machine shops in the industry.

Steel Fabricating and Welding Shop

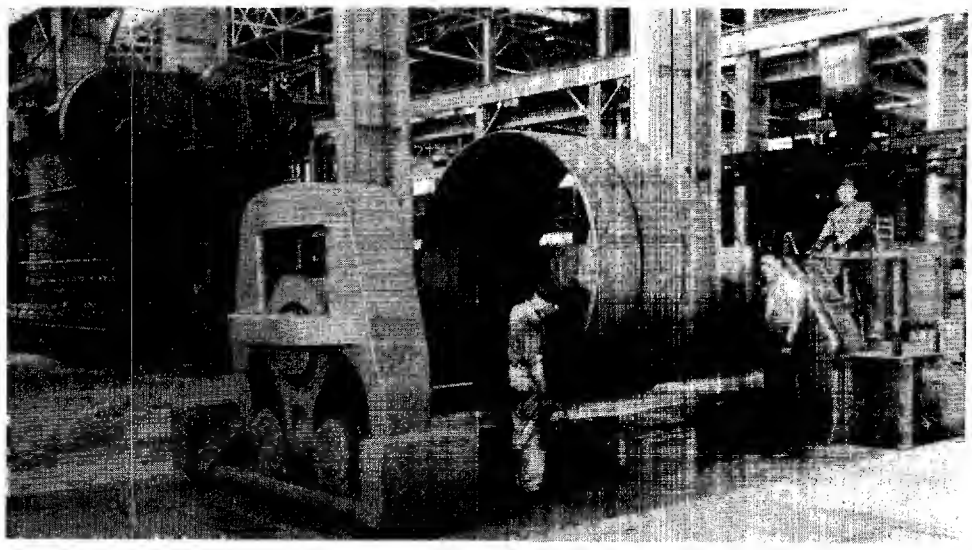
The new Weldment Division is a complete steel fabricating shop with a well equipped welding department that is capable of handling any type of welding—almost without size limit.

The heavy steel fabricating shop is equipped to handle steel plate 1" thickness and heavier and operations on plate as heavy as 10" to 12". In this shop, paper templates are used exclusively for all plate shape cutting. This eliminates the delay and additional cost generally connected with the use of burning templates of metal or wood. All irregular shapes in plate are flame cut with either the Airco Travograph or manually operated "Turtleback" torches. The Travograph is capable of carrying up to eight torches and is operated automatically by an electronic tracing head which follows a paper template by electric eye. This facility alone is said to reduce by 80% both the time and cost involved in template preparation plus attainment of greater cutting accuracy.

In this same shop is what is believed to be the world's largest press brake, and also one of the four largest existing plate bending rolls. The huge press brake exerts a rated pressure of 1000 tons and will accomodate a 16 foot wide plate between housings. The full width of the brake will take a 20 foot plate and will easily produce a 90 deg. bend in 1 inch plate the full width.

Being primarily in the heavy machinery business, Continental has built its own plate bending roll and this, incidentally, is built largely from weldments produced in the very same shop. This huge plate bending roll will bend 14 foot wide 2 inch thick plate cold to an inside diameter of 42 inches.

The equipment in this shop also includes a plate squaring shear which will shear 1 inch plate in widths up to 12 feet.



Claimed to be one of the four largest plate bending rolls in the country this equipment in the new Continental Weldment Division is capable of bending 2" plate 14 feet wide to an inside diameter of 42". Built in the company's own shops, this machine is an excellent example of weldment applications to machine design. The yoke shown on the fore end of the machine, for instance, is a composite of castings and fabricated plate. In the left background is the world's largest capacity 1000-ton press brake. It will bend plate up to 2" thick and handle a 20 foot width maximum or 16 foot width between housings.

The lighter steel fabricating shop is equipped in about the same manner but for the handling of ½ inch and lighter plate. This includes two 600 ton hydraulic presses. one a gap press with a 9 x 12 foot bed and a 600 ton side ram; the other a four post press with 8 foot by 4 foot between columns on the bed. There is also a 300 ton press brake which will bend ½ inch by 10 foot plate. Shearing capacity will handle a ½ inch by 12 foot plate and a new plate bending roll is being installed which will bend ½ inch by 16 foot wide plate to a radius of 9 inches. A new rotary shear will produce bevel cuts or shear to circular or irregular shapes on 1 inch or lighter plate. A punch press located in this department will punch 1½ inch holes in 1¼ inch plate. Radial drills complete this department.

Modern Welding Equipment

The welding shop provides a large bay for the assembly of fabricated units and is fully equipped with the most modern equipment. Three 10 ton electrically operated welding positioners are conveniently located for either manual welding or automatic submerged arc welding. The fully automatic submerged arc equipment is termed more advanced than any other in existence due to its ability to move its welding head through a 270 deg. arc as well as having the usual vertical and lateral head movement. Comparisons of its speed are shown by records of weld deposits amounting to 25 to 30 pounds per hour contrasted with 3 to 5 pounds per hour done by hand. Further, due to the flexibility of this machine it is economical to produce series of extremely short welds while other methods frequently prove uneconomical on welds shorter than 3 to 4 foot. This equipment is augmented by numerous semi-automatic welding heads and the usual hand arc.

Two large shot blast cleaning rooms are in operation and plenty of stress relieving equipment is in evidence. This includes a large 12 x 20 x 45 foot pit type stress relieving or annealing furnace and a battery of 14 car bottom type furnaces with 10 x 10 foot openings, 20 feet long.

Size and weight of product are almost without limitation in this new shop due to its spacious layout and heavy duty crane capacity. The building is 775 feet long and contains three bays having widths of 56, 52, and 72 feet respectively. A total of sixteen cranes serve this production area with the heavy fabrication bay being served by two 60-ton cranes on the same track. Loads of 150 tons or more can readily be accommodated by combinations of adjacent cranes.

X-ray facilities in an adjacent building provide 1,000 volt commercial equipment with complete laboratories. One of the largest, heavy duty machine shops in the district is also in an adjacent building for precision finishing and certain basic machining equipment is in the process of being installed directly in the weldment building.

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FOR THE IRON, STEEL AND
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LEWIS FOUNDRY AND MACHINE DIVISION OF BLAW-KNOX COMPANY · PITTSBURGH, PA.

THE STEEL INDUSTRY

Columbia and Geneva Steel To Increase Production

IN the light of the nation's current defense program, in which steel will undoubtedly play an important role, Columbia Steel Company has decided to increase substantially the steel-finishing facilities of its Pittsburg, California, plant, it has been announced by Alden G. Roach, president of the west coast subsidiary of United State Steel.

Additional cold reduced sheet and tin plate facilities will be installed at Pittsburg, with an annual capacity of approximately 215,000 net tons of sheets and tin plate.

The new facilities, when completed, will enable Columbia Steel to increase materially its production of both tin mill products and sheets, for which there is an ever-increasing demand on the Pacific coast.

Work on the new facilities will be started as soon as possible, and it is expected that the new mill can be put in operation by late summer of 1951. Mr. Roach estimated that these additions eventually will increase the working force at Pittsburg by some 800 employees.

Concurrently with this announcement, Geneva Steel Company, another U. S. Steel subsidiary, is announcing the installation of new facilities at its Geneva, Utah, plant, for the production of an additional 100,000 net tons of hot rolled steel sheets annually. "When these two programs are completed, Columbia Steel and Geneva Steel will be in a better position to help meet the growing steel needs of the west, as they will then have a combined annual capacity for the production of approximately 640,000 tons of sheet and tin plate products, as well as a large capacity for the production of other steel products in demand on the Pacific coast.

The present cold reduction sheet and tin plate mill at Pittsburg, which was placed in operation two years ago, will be enlarged considerably to house the new equipment, which will include a continuous pickler; a four-stand cold reduction mill for cold rolling steel up to 54 inches in width; an electrolytic cleaning line; an electrolytic tinning line; four additional coil annealing furnaces; a side trim and recoil line; and a continuous sheet galvanizer. The latter is a recent development in the steel industry and will mark the first time such equipment has been installed in the west.

Breakdown steel coils, the raw material for the Pittsburg sheet and tin mill, will continue to be supplied from Geneva Steel Company in Utah.

"Our decision to go ahead now, when the serious international situation has emphasized the great importance of an adequate steel supply for this country for defense and other purposes, and to increase this company's capacity for the production of much needed sheet and tin mill products, should be welcome news to all users of these products on the Pacific coast," Mr. Roach said. "It will mean that these customers will have one of the most modern sources of supply in the United States, located in the center of the west coast market for these products. Although these new facilities will be located at Pittsburg, California, we are actively continuing our study of the new facilities we need we plan to build in the not distant future in the Los Angeles district in order better to take care of the steel needs of that rapidly developing industrial area, which is of so great importance to United States Steel. This new program at Pittsburg does not displace plans for expansion of facilities near Los Angeles, about which there will be an announcement at some later date."

* * *

Crucible Appoints G. M. Burrier Ass't General Superintendent

George M. Burrier has been appointed assistant general superintendent of the Midland Works of Crucible Steel Company of America. Mr. Burrier is a graduate of the University of Pennsylvania and was formerly associated with the Republic Steel Corporation. Mr. Burrier succeeds M. J. Mercer, who has resigned to take a position with another company.

* * *

Coke Pushed from New Battery at Clairton

U. S. Steel's high-geared production pace in Pittsburgh district mills got another boost August 11 with the pushing of the first coke from a new battery of by-product ovens at Clairton Works of Carnegie-Illinois Steel Corporation.

The new unit annually can produce upwards of 600,000 tons of coke for steelmaking. It is the sixth battery of modern coke ovens built at Clairton since the end of the war in a continuing program of replac-

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Additional cold reduced sheet and tin plate facilities will be installed at Pittsburg, with an annual capacity of approximately 215,000 net tons of sheets and tin plate.

The new facilities, when completed, will enable Columbia Steel to increase materially its production of both tin mill products and sheets, for which there is an ever-increasing demand on the Pacific coast.

Work on the new facilities will be started as soon as possible, and it is expected that the new mill can be put in operation by late summer of 1951. Mr. Roach estimated that these additions eventually will increase the working force at Pittsburg by some 800 employees.

Concurrently with this announcement, Geneva Steel Company, another U. S. Steel subsidiary, is announcing the installation of new facilities at its Geneva, Utah, plant, for the production of an additional 100,000 net tons of hot rolled steel sheets annually. When these two programs are completed, Columbia Steel and Geneva Steel will be in a better position to help meet the growing steel needs of the west, as they will then have a combined annual capacity for the production of approximately 640,000 tons of sheet and tin plate products, as well as a large capacity for the production of other steel products in demand on the Pacific coast.

The present cold reduction sheet and tin plate mill at Pittsburg, which was placed in operation two years ago, will be enlarged considerably to house the new equipment, which will include a continuous pickler; a four-stand cold reduction mill for cold rolling steel up to 54 inches in width; an electrolytic cleaning line; an electrolytic tinning line; four additional coil annealing furnaces; a side trim and recoil line; and a continuous sheet galvanizer. The latter is a recent development in the steel industry and will mark the first time such equipment has been installed in the west.

Breakdown steel coils, the raw material for the Pittsburg sheet and tin mill, will continue to be supplied from Geneva Steel Company in Utah.

"Our decision to go ahead now, when the serious international situation has emphasized the great importance of an adequate steel supply in this country for defense and other purposes, and to increase this company's capacity for the production of much needed sheet and tin mill products, should be welcome news to all users of these products on the Pacific coast," Mr. Roach said. "It will mean that these customers will have one of the most modern sources of supply in the United States, located in the center of the west coast market for these products. Although these new facilities will be located at Pittsburg, California, we are actively continuing our study of the new facilities which we plan to build in the not distant future in the Los Angeles district in order better to take care of the steel needs of that rapidly developing industrial area, which is of so great importance to United States Steel. This new program at Pittsburg does not displace plans for expansion of facilities near Los Angeles, about which there will be an announcement at some later date."

* * *

Crucible Appoints G. M. Burrier Ass't General Superintendent

George M. Burrier has been appointed assistant general superintendent of the Midland Works of Crucible Steel Company of America. Mr. Burrier is a graduate of the University of Pennsylvania and was formerly associated with the Republic Steel Corporation. Mr. Burrier succeeds M. J. Meinen, who has resigned to take a position with another company.

* * *

Coke Pushed from New Battery at Clairton

U. S. Steel's high-geared production pace in Pittsburgh district mills got another boost August 11 with the pushing of the first coke from a new battery of by-product ovens at Clairton Works of Carnegie-Illinois Steel Corporation.

The new unit annually can produce upwards of 300,000 tons of coke for steelmaking. It is the sixth battery of modern coke ovens built at Clairton since the end of the war in a continuing program of replac-

ing old ovens in order to keep pace with the record-shattering output of the steel mills.

There are 61 modern ovens in the new battery. They replace a 25 year old unit, razed a year ago after a lifetime production of ten million tons.

In addition to turning out close to 900 tons of coke a day, the new ovens will produce some 14 million cubic feet of by-product gas daily for use in district steelmaking operations and large quantities of other by-products for chemical manufacturing industries.

The ovens are of the latest design, with self-sealing doors and double collector mains which are designed to reduce smoke to an absolute minimum.

* * *

W. C. Snyder Named President of Freyn Engineering

W. C. Snyder, Jr., vice president and manager of the metallurgical department of the engineering and construction division of Koppers Company, Inc., has been named president of Freyn Engineering Company, a wholly-owned Koppers subsidiary with offices in Chicago, Ill.

Mr. Snyder's appointment follows the death of Louis T. Shorley, former president and treasurer of Freyn, on July 20, 1950.

The appointment of Gordon Fox, vice president of Freyn, to the post of executive vice president also was announced. In addition, Mr. Fox will fill the unexpired term of Mr. Shorley on the Freyn board of directors.

E. J. Westcott, secretary of the Chicago engineering firm, will occupy the dual position of secretary and treasurer.

Mr. Snyder will retain his responsibilities as manager of the metallurgical department of the Koppers division and his headquarters in Koppers central offices in Pittsburgh. Mr. Fox will manage the activities of Freyn's Chicago headquarters.

A vice president of Koppers engineering and construction division since June, 1947, Mr. Snyder was named manager of the metallurgical department in August, 1949. Before assuming the latter office he acted as Koppers contract manager in Chile, where the engineering and construction division supervised the erection and initial operation of a 500-ton per day integrated steel mill for the Pacific Steel Company of Chile.

* * *

National Tube Promotes Officers

John E. Goble, president of the National Tube Company, subsidiary of United States Steel, has announced the election of William F. McConnor as executive vice president of the company, and of H. J. Wallace as vice president in charge of sales, succeeding Mr. McConnor in that position.

H. J. Wallace

W. F. McConnor

Mr. McConnor has been with the National Tube Company since 1917, serving in various capacities in the operating, engineering and sales departments. Mr. Wallace has been general manager of sales since 1946. He started with the company in 1928 as a laborer at the Ellwood City, Pa., plant.

* * *

F. B. Rackley Elected President of Jessop Steel Co.

Frank B. Rackley, formerly vice president of the Jessop Steel Company, Washington, Pa., was elected

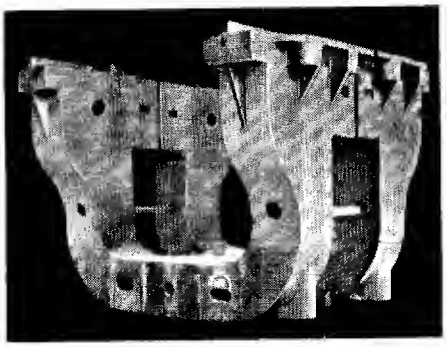
W. C. Snyder, Jr.

Gordon Fox

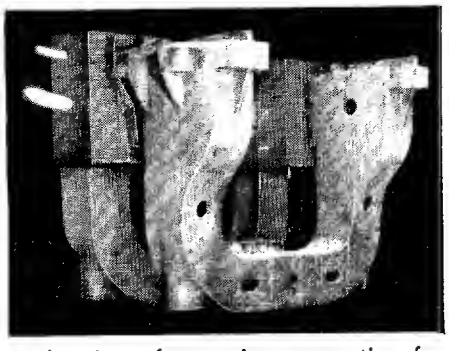
WHEN A LEADING steel producer undertook to construct a new ingot stripper in one of its major works, the casting of a 50-ton housing posed a problem . . . Limited furnace capacity made it impossible to cast the giant part in one piece.

After consultation between the engineering firm in charge and M & T Thermit experts, it was decided to cast two halves and weld them together with Thermit. Three welds were required: one 32 x 29 and two each 44½ x 24. Approximately 5-tons of forging thermit were used to make the three welds. Among many economies effected, only one-half pattern had to be made.

For efficient and economical fabrication *or* repair, think of Thermit . . . Write for descriptive bulletin. It's packed with facts that may help solve a problem of yours.



Parts of huge housing inverted and aligned for welding.



Preheating of parts in preparation for Thermit Welding.

METAL & THERMIT CORPORATION

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Frank B. Rackley

President of the company at a meeting of the directors on July 31st.

Mr. Raekley joined the Jessop Steel Company in June, 1948, as General Manager of sales. He was made vice president in charge of sales in October, 1948, and exceutive viee president in May, 1949.

Prior to joining the Jessop Steel Company, Mr. Rackley was manager of stainless sales for the Western Area of the Carnegie Illinois Steel Corp. He began his career as a file elerk and office boy for the Corporation in 1936 and was steadily promoted to positions of increasing responsibility. He attended Carnegie Institute of Teehnology and the University of Pittsburgh.

During a hearing at the Washington County, Pa., courts held on July 31st, the company's reorganization plan was approved, as well as the new board of direetors elected earlier in July.

* * *

J. Calvin Bown Nominated as 1951 President of ASME

J. Calvin Brown, of Los Angeles, Calif., owner of the firm bearing his name in that city, has been nominated as the 1951 president of The American Society of Mechanical Engineers. Mr. Brown heads a slate of new ASME officers, including four regional vice presidents and two directors-at-large, submitted by the society's nominating committee. Sinec only one name is presented for eaeh offiee, nomination is tantamount to election.

Formal election will take place in the Fall by letter ballot of the membership, which totals more than 32,000 engineers. The new officers are to begin their terms at the eonclusion of the ASME annual meeting in New York next Deeember. Mr. Brown will succeed James D. Cunningham, president of Republic Flow Meters Co., of Chicago.

News of the Plants

The Youngstown Sheet and Tube Company will build four new open hearth furnaces and other facilities at its Indiana Harbor plant at East Chicago, Ind.

A new roll shop will be erected at the Indiana Harbor strip mill and finishing facilities will be added for hot rolled sheets and strip.

Company directors approved plans for these two projects at their meeting in Youngstown Wednesday, June 21. Engineers already are drawing plans which will be submitted to contractors in the near future.

The new furnaces, with their necessary facilities, will produce from 550,000 to 600,000 tons of steel ingots per year.

When these furnaces are in operation, Indiana Harbor's Bessemer department will be discontinued. As this produces about 300,000 tons of ingots per year, the net increase at Indiana Harbor will be 250,000 to 300,000 tons.

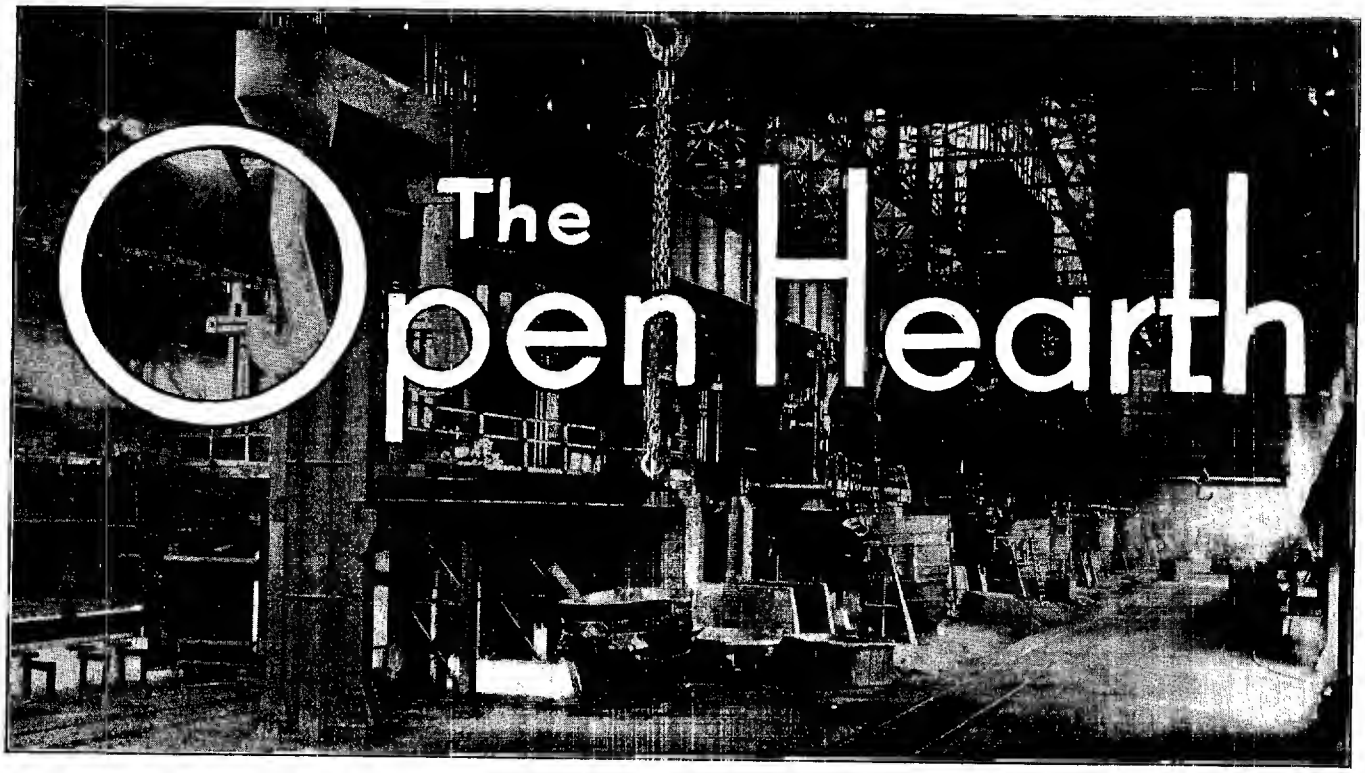
Improvements at Indiana Harbor will boost the company's total ingot capacity to an estimated 4,500,000 tons of ingots per year compared with 4,082,000 tons at present.

Reflecting the strong demand for its products and increased and more economical production from improved and expanded facilities, Allegheny Ludlum Steel Corporation during the first six months of 1950 established record sales and net earnings while giving employment to the greatest number of workers in its entire history. Faster, more economical production made possible by the company's recently completed $30,000,000 plant improvement program was the key to the records, Mr. Batcheller, chairman, told the directors. He declared that results obtained from the improvement program already completed deeply underscored the need for improvements scheduled in the $23,600,000 project recently begun.

Supplementing U. S. Steel's recent announcement of forthcoming steel production, the Carnegie-Illinois Steel corporation, major steel-producing subsidiary, has disclosed comprehensive improvements in its operations at Gary. They are: (1) rebuilding of two coke oven batteries at the Gary Steel works, and (2) revamping of stainless steel facilities at the Gary Sheet and Tin mill.

The coke oven batteries to be rebuilt are Nos 13 and 15. The former battery already is dismantled and undergoing reconstruction. The battery, including 77 coke ovens, is scheduled to be returned to operation in December of this year. Dismantling of No. 15 battery is underway and it is to be rebuilt by May, 1951.

At the Sheet and Tin mill, welding, shearing, leveling and polishing facilities will be added to the present stainless steel rolling and finishing installations to enable the plant to produce full finished stainless steel sheets.



Lawrence F. Black of Cleveland, Ohio, has been appointed general superintendent of the Geneva plant, Geneva Steel Company, United States Steel subsidiary. Mr. Black formerly was assistant chief engineer of the American Steel and Wire Company, another United States Steel subsidiary. He has been associated with United States Steel Corporation since 1924 when he began working at the American Steel and Wire Company's Donora Steel and Wire Works. From 1933 to 1937, Mr. Black was field engineer of the Donora Zinc works. He then became assistant master mechanic, assistant general master mechanic and later, division master mechanic of the Donora Steel and Wire Works.

In 1943 he transferred to the company's Duluth, Minn., works where he was general master mechanic. Two years later, he was appointed superintendent of engineering and maintenance.

He was named assistant chief engineer in the engineering department of the American Steel and Wire Company's home offices in Cleveland in 1948.

Roy H. Nelson of Struthers has been appointed assistant superintendent of Brier Hill Blast Furnaces of Youngstown Sheet and Tube Co.

On Aug. 16, 1923, Mr. Nelson joined The Youngstown Sheet and Tube Company as an electrician helper at Campbell Coke Plant. He was appointed cinder yard foreman of Campbell Open Hearth the following year, by-products operator at Campbell Coke Plant in 1926; gas engineer at Campbell Blast Furnace in 1933, a blower in 1936, blower foreman in 1941 and general turn foreman in 1947.

* * *

David H. E. Genter has been appointed superintendent of the agricultural department of the Midland Works, Crucible Steel Company of America.

Raymond H. Hartigan has been appointed manager of the laboratory section of the central Research Department of Koppers Company, Inc. Also announced are the appointments of Gordon Black as assistant manager of the development section, and Peter W. Sherwood as manager of the engineering branch of the development section of the research department.

* * *

Carnegie-Illinois Steel corporation has announced the promotion of Milton L. Weislogel as assistant to general superintendent of the Gary Steel works. Also announced was the appointment of Frank A. Kelly as plant industrial engineer, succeeding Mr. Weislogel.

Mr. Weislogel has been associated with the plant since 1936, starting as a machinist handyman. He filled various positions until becoming a junior industrial engineer in 1938. He served in various supervisory capacities before becoming plant industrial engineer four years ago, the position he held until his new appointment. Mr. Kelly started as a water boy in Gary works 21 years ago. He served in various construction department jobs until 1936 when he joined the industrial engineering department. He has held various industrial engineering supervisory positions.

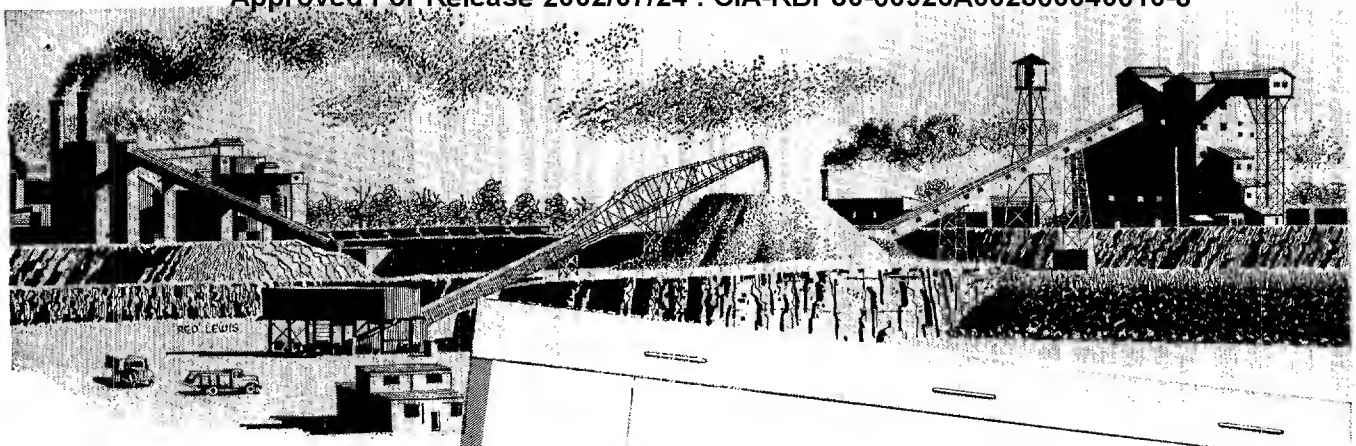
* * *

Norman F. Tisdale, Jr., who recently was graduated from the Massachusetts Institute of Technology, as a metallurgical engineer, has become associated with the Molybdenum Corporation of America in the development engineering department.

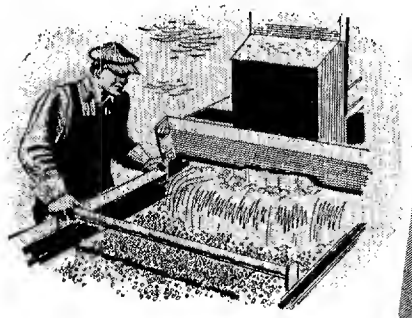
* * *

J. Warren Shaver and William Whigham, Jr. have been appointed assistant vice presidents, industrial relations of Carnegie-Illinois Steel Corporation.

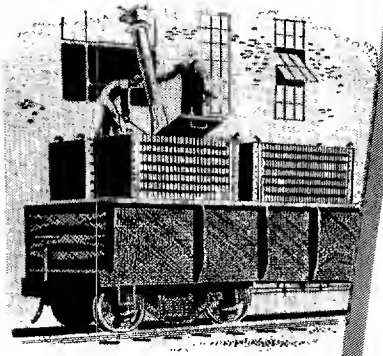
Mr. Shaver came to Carnegie-Illinois in 1944. Until the time of his present appointment, he has been



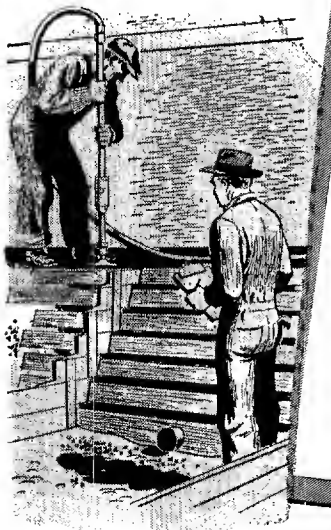
Quarry and processing plant of Basic Refractories Inc., at Narlo



Sizing raw dolomite by the wet screen process



Loading dead burned dolomite into a railroad container car



Cold-ramming Ramset repair in taphole area of open hearth

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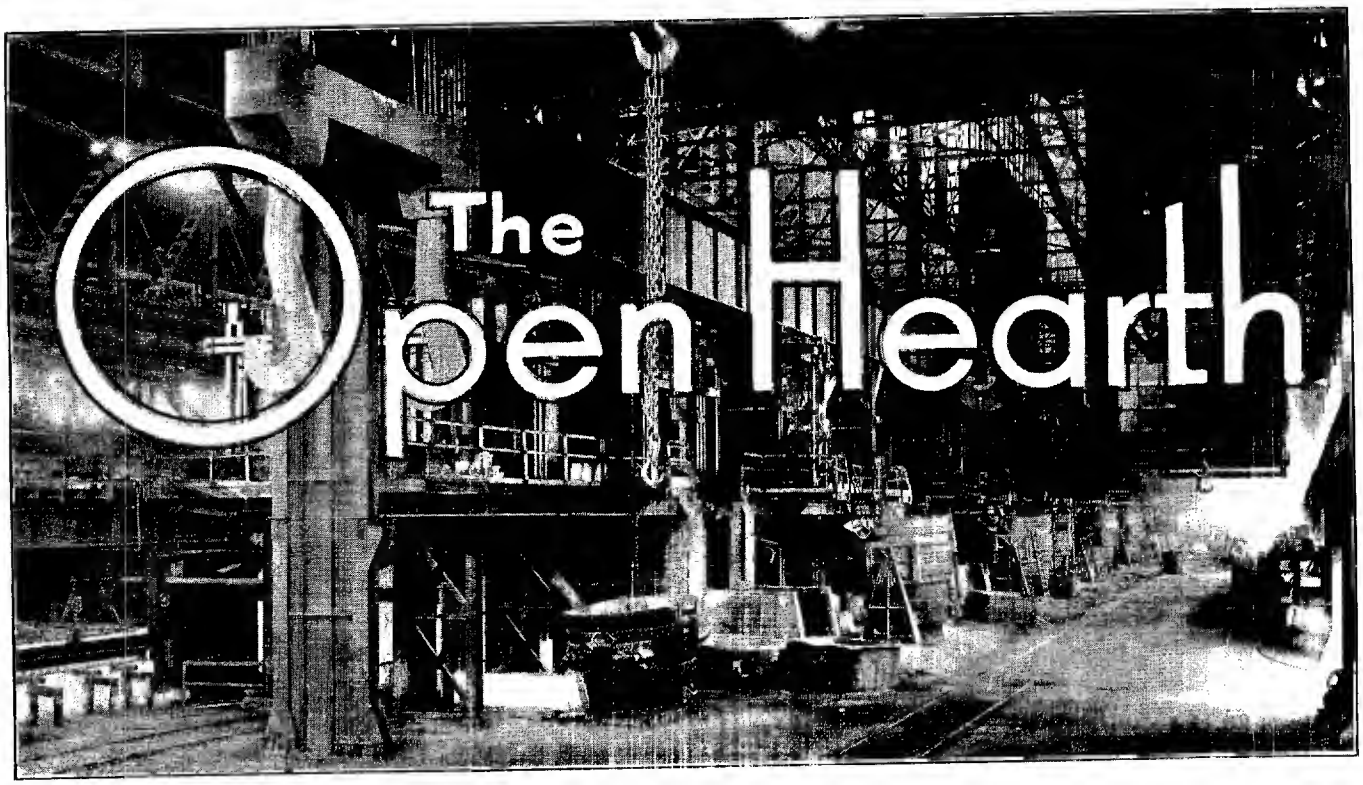
Adherence to these five cardinal principles for more than thirty years has made Basic Refractories Incorporated the largest manufacturer of granular basic refractories in the world. In the future as in the past, you will continue to benefit by the terms of the unwritten contract.

BASIC FURNACE REFRACTORIES

Basic Refractories Inc., 845 Hanna Building, Cleveland



an attorney specializing in industrial relations matters for the company. Mr. Whigham was first employed at the Clairton Coke Works of Carnegie Steel Company, in the operating department.

* * *

Peabody Engineering Corporation of New York has appointed Allen H. Jones as manager of its newly-opened Chicago office.

Although the Peabody Engineering Corporation maintain offices abroad, the Chicago office is the first Company-operated district office in the United States.

* * *

D. J. Richards, vice-president—sales, E. F. Houghton & Co., Philadelphia, has been placed in complete charge of all domestic and foreign sales activities. Mr. Richards will also act as director of advertising and will supervise the activities of the product development and the sales development department.

* * *

Lone Star Steel Company has announced the appointment of Edward L. Beatty, Rufus C. Somerville and Richard Hirsch to handle every phase of the company's sales engineering.

* * *

George P. Thomas, Jr. has been elected Vice President of the Thomas Machine Manufacturing Company, Pittsburgh, Pa.

Mr. Thomas has been with the Company continuously since 1932, with the exception of three years spent in the armed forces, and currently is acting as purchasing agent. He will continue in this capacity in addition to his new duties as vice president.

* * *

James L. McFarland has been appointed manager of engineering of the General Electric Company's Schenectady industrial heating engineering division. Mr. McFarland joined G. E. in 1913 as a student engineer on the Test Course. In 1915 he entered the engineering department of the industrial heating divisions, and was named assistant division engineer in 1938, the post he held at the time of his present appointment.

* * *

Irvin H. Jones, Manager of the patent section, research department of Koppers Company, Inc. since 1944, became international development manager for Koppers on August 1. Dr. W. C. Rueckel, vice president, who has assisted in setting up the international development program of the Company since formation of an international sales section last February, will return to his position as manager of export sales for the engineering and construction division. Dr. W. J. Monacelli, assistant manager of the patent section, research department, succeeds Mr. Jones.

* * *

H. R. Gibbons has been appointed to the position of chief engineer in full charge of product design, research, application and service engineering of the Hyatt Bearings Division of General Motors Corporation, Harrison, N. J. He succeeds O. W. Young who assumes new duties as technical assistant to the office of the general manager.

* * *

C. J. Stakel, formerly general manager of the Cleveland-Cliffs Iron Company's iron ore operations, has retired from that position but will continue to serve in a consulting capacity.

W. A. Sterling has been elected a vice president of the Company and will be located at the company's executive offices in Cleveland, Ohio. C. W.

(Continued on Page 1098)

Rem-Cru Titanium Names Officers and Director

Directors and officers of Rem-Cru Titanium, Inc., a new manufacturing company for titanium and titanium alloy products, jointly owned by Remington Arms Company, Inc., and Crucible Steel Company of America, has been announced.

Chairman of the Board of Rem-Cru is C. K. Davis of Bridgeport, Conn., president and general manager of Remington. President and a director is W. H. Colvin, Jr., of New York, president of Crucible.

The other officers and directors are:

Director, W. R. Warden of Bridgeport, vice-president and assistant general manager of Remington.

Director and vice president, R. S. Poister of Pittsburgh, Crucible vice president in charge of operations.

Director, vice president and treasurer, W. U. Reisinger of Bridgeport, Remington vice president and treasurer.

Director, L. L. Ferrall of Pittsburgh, Crucible, director of metallurgy.

Vice president, W. F. H. Mattlage of Bridgeport, Remington director of production.

Secretary, K. R. Vogel of New York, secretary of Crucible.

For the present, manufacturing and sales headquarters of Rem-Cru will be in Bridgeport. Later the headqnarters will be established at Pittsburgh.

Lukens Disposes of Holdings in Iron Company

Lukens Steel Company has announced that is has disposed of its financial holdings in E. & G. Brooke Iron Company, Birdsboro, Pa., to Bayou Interests, Inc., of New York. However, the five-year contract, dated Dec. 1, 1947, with E. & G. Brooke Iron Company assuring Lukens of regular shipments of pig iron each month for its open hearth steelmaking, continues in effect without change.

Lukens, together with Worth Steel Company and Warren Foundry & Pipe Corp. acquired a controlling interest in the E. & G. Brooke Iron Company on Dec. 1, 1947.

J. W. Herman, Lukens treasurer, remains as a member of the board of directors of E. & G. Brooke Iron Company, but Charles Lukens Huston, Jr., and G. D. Spackman, Lukens president and vice president in charge of operations, respectively, have tendered their resignations as directors of the organization.

Furnace to be Built For Stanley Works

A slab heating furnace to serve a strip mill of the Stanley Works at Bridgeport, Conn., is being designed and will be built by Rust Furnace Company, Pittsburgh, Pa.

The triple-fired furnace, to burn oil, is being designed by Rust for a capacity of 50 tons per hour to deliver slabs at a temperature of 2250 degrees F.

Dimensions of the furnace will be 20 feet wide, with a 45 foot effective length.

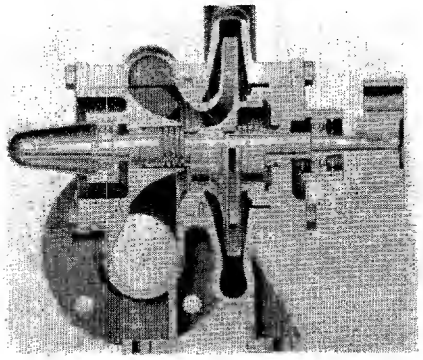
It will be equipped with three zone automatic temperature control and automatic furnace pressure control equipment. Plans now call for construction to begin early in the fall.

With The
EQUIPMENT MANUFACTURER

Pump

The new De Laval type GS pump which has just been announced, is designed to fit the idea of a service and exchange plan. All parts except the bare pump casing are contained in the rotor assembly. When maintenance is necessary, simply remove the top cover and end plate studs, lift out the assembly and drop a new one in place. Through the De Laval Service and Exchange Plan new rotors are available for immediate shipment from factory stock. The old one is returned and full credit given for all serviceable parts. As an alternate to this, a customer can exchange the entire pump for a factory rebuilt and guaranteed pump, with full credit again being allowed for serviceable parts.

Quite often large pump users have well equipped maintenance shops and, as a result, prefer to do their own maintenance work and carry their own stock of spare parts. The design of the GS pump fits this class of customer also. The casing is horizontally split for easy access without breaking piping connections. All parts are interchangeable and available for immediate shipment from factory stock.



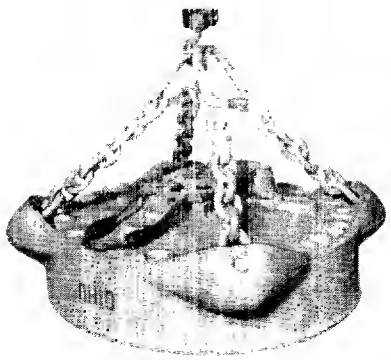
In designing the GS pump to be as "maintenance-free" as possible, there were two other maintenance expenses to be considered: one is periodic lubrication and the other is the occasional re-packing of a stuffing box. The GS pump eliminates even these expenses. Simple proved mechanical seals replace the stuffing box and the pre-lubricated bearings in the pump are like the ones in the motor . . . lubricated for life.

The new De Laval GS pump is built in three sizes for capacities to 450 gpm. heads to 230'.

For further information, contact the De Laval Steam Turbine Company, Trenton 2, New Jersey.

Basket Type Magnets

A new 55-inch "basket" type Ohio lifting magnet, similar in general construction to the larger 4 and 6-coil 65-inch Ohio basket magnets, is announced by The Ohio Electric Mfg. Co., 5900 Maurice Ave., Cleveland, Ohio.

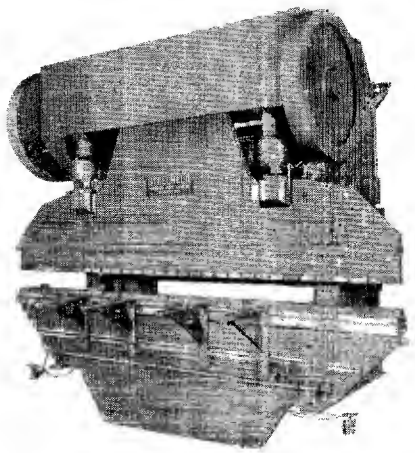


Expressly developed for rough service in steel mills, foundries, scrap yards and fabricating plants where operating conditions are unusually severe, Ohio basket type magnets feature an outer ring cast in one piece with four integral "ears" which project beyond the outer ring circumference and protect the magnet from damage. The magnet is suspended on four alloy steel chains attached to the ears.

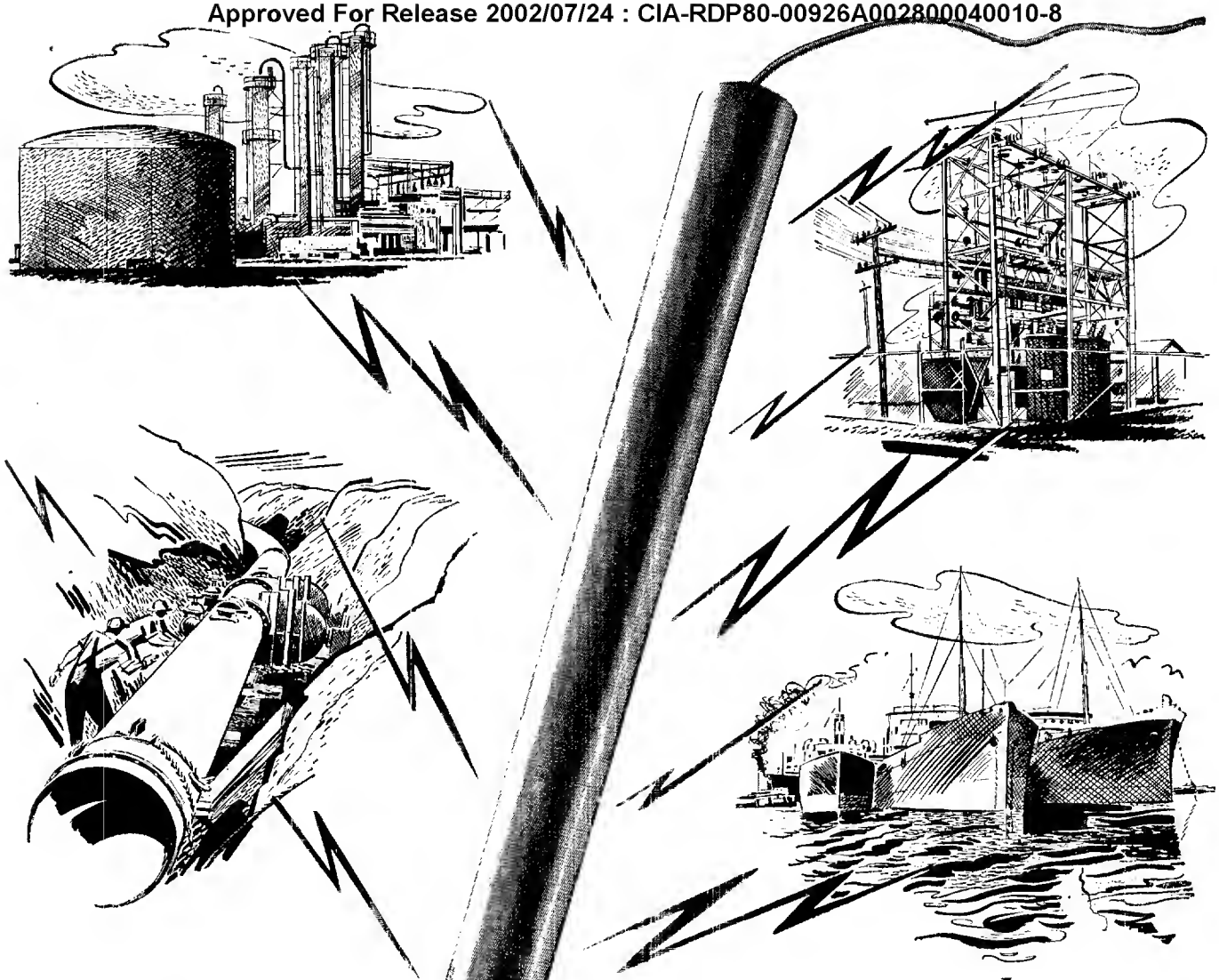
Ohio basket type magnets are carefully sealed, thus preventing malfunctions commonly associated with magnets that "breath" while cooling off. Lifting coils are wound from top grade wide copper strip for maximum lifting power. They are insulated with a heavy-duty asbestos tape that remains unaffected by heat or the hard knocks to which a magnet is subjected in skull cracker service or in handling heavy slabs.

Steelweld Bending Press

The Cleveland Crane and Engineering Co., Wickliffe, Ohio offers an unusual Steelweld bending press Model M06-12, having a bending capacity of 500 tons, which will bend up to ⅜" plate 20'-6" long. The machine is designed to take a special large gooseneck punch, and for this reason has a shut height of 30 inches. However, the ram is provided with an extension as shown in the photograph, which brings the shut height down to 16 inches permitting the use of standard dies when desired.



The overall height of this machine is 17'-1", with 2'-6" below the level of the floor. The bed and ram have an overall length of 20'-6" which includes a 3-foot extension on both ends. The depth of the bending press is 9'-0", and the distance between the housings is 12'-6". An extra deep 18-inch throat permits unusual bending possibili-



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● Regardless of what the job is . . . how corrosive the environment—whether wet or dry, hot or cold—you can depend upon "National" ground anodes to provide efficient, positive protection against underground and underwater corrosion.

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For complete details on "National" ground anodes, write to National Carbon Division, Union Carbide and Carbon Corporation, Dept. BF.

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NO METAL CAN TO LEAK OR CORRODE

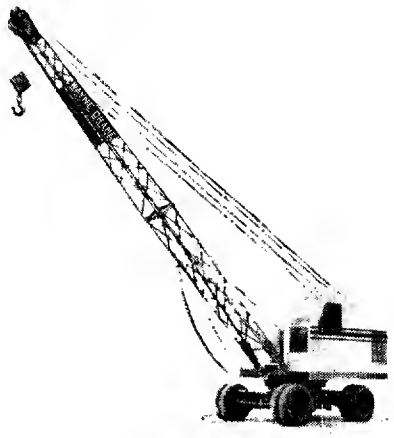
ties and is a standard feature of all large Steelweld presses.

The machine has a 6-inch stroke, with two speeds of 7 or 20 strokes per minute. The clutch is air-operated and controlled by two foot-operated valves. A reverse flywheel permits reversing the ram at any position of the stroke.

Industrial Wayne Crane

The new Heavy-Duty Wayne Crane Model 20 is particularly designed for industrial yard lifting and materials handling operations. With a lifting capacity of 6 tons at a 10-foot radius with standard counterweight, and 10 tons with outriggers extended and auxiliary counterweight, the new self-propelled, rubber-mounted machine has been announced by the Wayne Crane Division of American Steel Dredge Company, Fort Wayne, Indiana.

The working weight of 27,920 lbs. as a crane indicates extra-sturdy construction for a 6-ton machine. The Model 20 will accommodate up to a 39-inch magnet or ½-yard clamshell and dragline buckets in addition to the lifting crane operation. A single engine, gasoline or Diesel, supplies motive and operating power.



The Model 20 travels, lifts, booms and swings simultaneously or independently. Four-point "walking" beam suspension provides equal stability while lifting or digging even on rough terrain. Full 360° operation, 7′ 8″ wheelbase and short turning radius facilitate operations in "tight" spots. Mounted on four sets of dual pneumatic tires, the new Model 20 travels at speeds up to 15 m. p. h.

Standard power unit for the Model 20 is a 62 h.p. six-cylinder gasoline engine. However, any of several makes of Diesel or gasoline engines of required power and speed may be furnished on customer's specifications.

For complete job data and other information, write Wayne Crane Division, American Steel Dredge Company Inc., Fort Wayne, Indiana.

Ground Clamp

A new light weight, low cost ground clamp of 300 ampere capacity, the GC-3, has been developed by The Lincoln Electric Company of Cleveland, Ohio.

The GC-3 is designed to provide a convenient, readily movable, yet solid ground connection for welding jobs where welding currents do

not average over 300 amperes. The new clamp not only cuts accessory costs for these jobs but also eliminates for welders the inconvenience of handling heavy duty clamps on jobs where their extra capacity is not needed.

The clamp weighs only 1½ pounds and has a jaw spread of 2½ inches. A heavy direct acting spring gives a positive, slip proof connection with the work. The frame is made of pressed steel construction. The jaws are made of a special steel and copper alloy, "Lincalloy", which is both highly conductive and highly resistant to wear. "Lincalloy" is manufactured by Lincoln Electric especially for ground clamp and electrode holder jaw use.

The GC-3 does not replace the Lincoln heavy duty GC-5 which has a capacity of 500 amperes.

Purifes and Lubricates Low Pressure Lines

Called an ideal method to both purify and to lubricate low pressure air lines is an interesting, new dual control system known as the Airlube Control Unit.

The Unit combines two basic sections with a common regulator and gage. One control, Pur-o-fier is designed to remove oil, moisture and dirt for air and gas lines. The other, Pur-o-luber provides finely atomized lubrication for air lines.

The Pur-o-fier precipitates water and oil by a scrubbing action. It cleans with a series of impringing baffles. They are so arranged that maximum surface contact is achieved on each plate. All conventional screens have been eliminated to prevent clogging. A transparent, plastic bowl provides a visible check on the dirt entrainment level and carries a petcock for easy drainage. The unit has a 45 c.f. capacity and withstands up to 250 p.s.i.

The Pur-o-luber, on the other hand, regulates the delivery of suspended oil vapor in accord with any changes in air pressure.

Both the Pur-o-fier and Pur-o-luber can be supplied for operation as separate units. Further information may be obtained by writing James G. Murdock, sales manager, Airlube, Inc., 3422 W. North Ave., Chicago 4, Illinois.

PUBLICATIONS

MANUAL ON TECHNICAL CEMENTS—Considered a practical hand-book on the application of adhesive cements and compounds is the exhaustive new Engineers' Production Manual issued by the Sauereisen Cements Co., Sharpsburg Station, Pittsburgh 15, Pa.

It contains 64 pages of useful information, with over 150 illustrations, data and charts, and will prove of value to laboratory technicians, production men, engineers and everyone interested in the application of technical cements. A free copy of this 64-page book will be sent on request.

* * *

REFRACTORY CONCRETE—A revised edition of the booklet "Lumnite Refractory Concrete" has just been published. Latest available information on Refractory and Heat-Resistant Concrete is given in this new edition of the booklet. "Lumnite Refractory Concrete" is a manual of how-to-do-it information. Detailed information on Refractory Concrete mixes—proportions of Lumnite and various aggregates—is given in this booklet. From the tables contained in this publication, you can select the proper types of Refractory Concrete for a wide range of temperatures and insulating conditions. Copies can be obtained on request from the Lumnite Division of the Universal Atlas Cement Company, Chrysler Bldg., New York 17, N. Y.

* * *

TURBINE—Bulletin 4215, released by The De Laval Steam Turbine Co., contains a complete description and specifications of a new single stage mechanical drive turbine suitable for pressures to 1450 psig, initial temperatures to 950 F.T.T. and back pressures to 300 psig. The CP turbine is the first standard single stage mechanical drive turbine to be designed especially for high pressure service. The labyrinth shaft seal used in the CP turbine consists of a series of shaft grooves and mating tongues of stainless steel packing. The number of labyrinths in the shaft depends upon the exhaust pressure rating—as many as 52 labyrinths per side being employed for the highest pressures. This prevents leakage effectively, reduces losses, lasts longer and requires less maintenance.

* * *

SPLASH PLATES—A new Catalog Section has been issued by National Carbon Co., Inc., which describes the use of carbon in the construction of splash plates for the blast furnace. The principle advantages of carbon for such service are listed, with suggestions that greatly simplify splash plate use.

The two methods of applying standard carbon shapes in splash plate construction are detailed. The first method consists of lining the conventional iron splash plate casting with "National" standard straight or arch carbon brick, while the second recommends the use of a one-piece carbon slab suspended within a welded steel frame. Both methods are illustrated.

A copy of Catalog Section M-8704 may be obtained by writing National Carbon Co., Inc., 30 East 42nd Street, New York 17, N. Y.

* * *

DRY-TYPE TRANSFORMER—The versatile and flexible Allis-Chalmers dry-type transformer available in a wide range of sizes suitable for duty right at the load center is described in a new eight-page bulletin released by the company.

Designed for hard service, the transformer is built in single-phase and three-phase types, both using "Fiberglas" and other Class B insulating materials. It has an all-welded steel case, sturdy lifting hooks, strong side frames, generous air ducts and clamp-type connectors.

Copies of "Allis-Chalmers Dry-Type Transformers," Bulletin 61B6382A, are available upon request from Allis-Chalmers Mfg. Co., S. 70th St., Milwaukee, Wis.

* * *

BEARINGS AND CASTINGS—A new catalog "Bronze and Copper Bearings and Castings" has been released by National Bearing Division of American Brake Shoe Company.

Illustrated with pictures and charts, this 28-page booklet gives physical properties and comparative specifications for 27 different bronze alloys and 5 aluminum and manganese bronzes. It contains an outline of the many applications of bronze. Sizes and weights of rough and machined "Tiger" Bronze bars are tabulated.

Babbitt metals, their descriptions and uses, are also discussed and illustrated, and their various physical properties have been charted.

Copies of the catalog are now available and will be mailed upon request to the Advertising Department, National Bearing Division, American Brake Shoe Company, 4930 Manchester Avenue, St. Louis 10, Mo.

* * *

ROD MILLS—Hardinge Company, Incorporated, 240 Arch Street, York, Pennsylvania, has just published revised literature on Rod Mills for grinding and pulverising—Bulletin 25-B. This bulletin discusses the new type, Convex-Head Hardinge Rod Mill as well as the standard Hardinge Conical-Ended Rod Mill. It shows a number of typical installations as well as details of construction of the various models, specifications, and performance data.

* * *

OIL SEALS—The attached brochure, "Johns-Manville CLIPPER SEAL," is a sixteen page handbook of useful data for anyone needing information on oil seals. Photographs show where to use Clipper

(Continued on Page 1099)

Inland Steel To Increase Capacity

Inland Steel Company on July 27 disclosed plans to enlarge its steel making capacity to 4,500,000 net tons of ingots annually from its present rating of 3,750,000 tons.

The company, which is the leading independent steel producer of the middlewest, will construct a new open hearth shop with four 250-ton furnaces. It will be built on land already reclaimed from Lake Michigan beyond present buildings of its Indiana Harbor works in East Chicago, Indiana.

Furnaces of this size are a maximum that can be efficiently charged and tapped with equipment presently available, officials said, adding that they would incorporate all modern improvements that steel making experience had developed.

Their design will enable further expansion by the subsequent addition of duplicate units as conditions warrant, it was added.

The new furnaces will be coordinated with present installations in a way to minimize the need of auxiliary facilities, the company said, although some equipment for handling materials and re-heating ingots will be required.

Enlargement of some of the present open hearths will round out the 4,500,000-ton ingot capacity, officials explained. Continual improvements in the present shops brought capacity to 3,750,000 tons from a former rating of 3,400,000, they said. This was done, they said, by strengthening of buildings, improved material handling to and from furnaces, the addition of a new hot metal station and use of metallurgical oxygen also, larger pit cranes, together with larger steel ladles, have enabled the tapping of larger heats from existing furnaces.

With structural and material handling improvements already accomplished, several of the furnaces can be enlarged from 160 ton capacities to 200 tons, it was said.

The new open hearth shop will include a scrap yard, charging facilities, ingot mold yard and slag yard. Existing blooming mills will be equipped for the increased tonnage through the addition of new soaking pits and an elevated runway to speed the receipt of ingots from present open hearth furnaces.

No additions to blast furnaces or finishing mills are contemplated, the company said. Some increase in the capacity of existing strip mills is expected, however, from the building of an additional slab heating furnace, provision for delivering hot slabs to existing furnaces, and changes to produce larger coils.

The entire program should be completed and a 4,500,000 ton annual capacity attained early in 1952, Edward L. Ryerson, chairman of the company, told stockholders.

* * *

Will Build Four Ships

Recognizing the national defense emergency and the need for augmenting iron ore and limestone carrying capacity on the Great Lakes, two subsidiaries of United States Steel have decided to build four new ships immediately for such service.

Pittsburgh Steamship Company, U. S. Steel's iron ore carrying subsidiary on the Great Lakes, will order the construction of three standard bulk type ore-carriers of 18,000 tons capacity each, and Bradley Transportation Company, another subsidiary, which transports limestone on the Great Lakes, will order the construction of one self-unloading vessel of 18,000 tons capacity. All four vessels are similar in type to the largest vessels now in use in both classes. Construction of the ships will be completed in time for the opening of the 1952 iron ore shipping season, which normally begins early in April.

United States Steel announced, on July 19, a program to provide increased quantities of steel to help meet the needs of the present emergency through an increase of 1,660,000 tons in the steelmaking capacity of the Pittsburgh and Chicago district plants of Carnegie-Illinois Steel Corporation, its principal steelmaking subsidiary. Iron ore and limestone are used, together with coke, to produce pig iron which is the principal raw material in the manufacture of steel.

* * *

Armco To Enlarge Zanesville Plant

Charles R. Hook, chairman of Armco Steel Corporation, has announced that the company is spending approximately $1,500,000 to modernize and expand its Zanesville, Ohio plant. Engineers have finished the plans and construction work, already started, will be completed within the year.

"This construction program will increase considerably the capacity of our Zanesville plant," Mr. Hook declared. "Expansion is necessary because the demand for electrical steel made at Zanesville has been more than the plant can produce."

"We estimate that more than 100 permanent jobs will be created by our expansion program in Zanesville," Mr. Hook said.

* * *

Steel Industry Purchases Foreign Scrap

Robert W. Wolcott, Chairman of the Committee on Iron and Steel Scrap of American Iron and Steel Institute, has announced that the steel industry had increased its purchases of high quality foreign scrap to a figure between 400,000

and 500,000 tons. This scrap is to be delivered over the remainder of the year at prices somewhat less than prevail in the American market.

Contrary to statements made in the trade, export licenses have been granted on this full tonnage, and ships have been chartered and scheduled to insure the delivery of this scrap before December 31, 1950.

Wolcott further said that, according to statements from representative steel companies, mills are in a fairly comfortable position due to the present substantial inventories and the receipt of foreign scrap due from earlier orders and now arriving in this country.

Freight Car Orders Increase

Domestic freight car orders during July totaled 30,065, the largest monthly figure since 1924, the American Railway Car Institute has announced.

The new orders constitute a "first instalment" in the continuous program of car-buying announced by the Association of American Railroads on July 28. Commitments for over 60,000 additional cars were made by the railroads at that time as part of a program for building the Class I freight fleet to a total of 1,850,000 cars.

The 30,065 new cars ordered during July divided 19,490 to independent car builders and 10,575 to railroad shops. The total compares with 2,195 ordered in June and 408 in July, 1949.

Deliveries of domestic freight cars, which have been increasing steadily for the past few months, declined slightly during July, primarily because of vacation shutdowns, the Institute stated. Deliveries totaled 3,464, of which 2,138 came from the car builders and 1,326 from railroad shops. By types, July production included: box 1,530, hopper 599, gondola 521, flat 10, refrigerator 466, stock 145, and tank 128.

The backlog of orders as of August 1, the Institute reported, was: car builders, 41,236; railroad shops, 25,848; total, 67,084. This compares with 40,585 on July 1 and 36,564

Meetings -

Sept. 18-22—Instrument Society of America, conference and exhibit, Memorial Auditorium, Buffalo, New York. Society headquarters, 921 Ridge Ave., Pittsburgh, Pa.

Sept. 19-21—American Society of Mechanical Engineers, fall meeting, Hotel Sheraton, Worcester, Mass., Society headquarters, 29 W. 39th St., New York 18, N. Y.

Sept. 26-29—Association of Iron & Steel Engineers, annual meeting and exposition, Cleveland Public Auditorium, Cleveland, Ohio. Association headquarters, Empire Building, Pittsburgh, Pa.

Oct. 16-20—National Safety Congress and Exposition, Stevens, Congress and Morrison hotels, Chicago, Ill. Council headquarters, 425 N. Michigan Ave., Chicago 11, Ill.

Oct. 23-26—American Institute of Steel Construction, annual meeting, Shamrock Hotel, Houston, Texas. Institute headquarters, 101 Park Ave., New York.

Oct. 23-27—National Metal Congress and Exposition, International Exposition, Chicago, Ill. Participation, A.I.M.E., A.S.M., Welding Society, American Society for Metals headquarters, 7301 Euclid Ave., Cleveland.

Oct. 27-28—Southern Ohio Section Open Hearth Committee A.I.M.E. annual meeting, Deshler-Wallick Hotel, Columbus, Ohio.

Nov. 3—Pittsburgh Section, Open Hearth Committee, and Pittsburgh Section, A.I.M.E. annual meeting, William Penn Hotel, Pittsburgh, Pa.

Dec. 7-9—Electric Furnace Steel Conference A.I.M.E. Hotel William Penn, Pittsburgh, Pa.

Lewis Foundry Receives Foreign Order

Lewis Foundry & Machine Division of Blaw-Knox Company has received on order from Austria under ECA provisions for the supply of steel strip rolling mill equipment.

The order was placed by the Alpine Montan Company, largest steel producer in that country, and is for installation in the Kreiglach plant at Leoben, Styria, Austria. It covers three rolling mills and auxiliary equipment for processing cold steel strip up to 18 inches wide.

War Uses Took Only 38% of Steel in 1943

Shipments of steel into direct war uses during World War II reached a maximum of 22.8 million net tons in 1943, or 38 per cent of total steel shipments in that year, according to data compiled by American Iron and Steel Institute. Direct war uses included ordnance, projectiles, tanks, aircraft, all shipbuilding, cantonments and construction of defense plants. The total of all the steel products shipped in 1943 was 59,906,000 tons.

In 1944, year of record steel production, the direct war shipments were 19.9 million tons or 32.9 per cent of all shipments that were reported according to users. Many other uses contributed to war purposes as well as essential civilian, such as containers, railroads, trucks, oil, mining and agriculture.

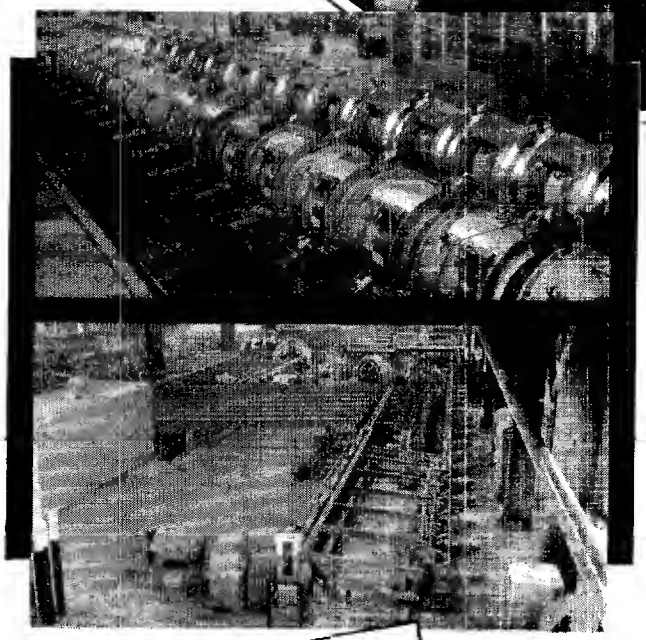
Among the largest and most fully sustained civilian demands was that of the railroads, running 7 to 9 per cent of total steel shipments each year.

In 52 months, from the beginning of 1941, through April, 1945, makers of ordnance, projectiles and tanks received 9 per cent of total steel shipments. Meanwhile 5 per cent of all shipments went into the construction of defense plants, cantonments, bases and similar uses. Shipbuilders, both naval and commercial, took 13 per cent of the steel. Most of the ships and defense plants, and many cantonments erected during the war are still in use or in stand-by condition.

The total amount of finished steel delivered to shipbuilders, and makers of ordnance, projectiles, tanks and aircraft in the 52 months was 63,568,000 tons, almost one-quarter of total shipments. This was 2.4 million tons less than the annual shipments of steel for all purposes in 1948.

NATIONAL TUBE COMPANY'S *NEW* Seamless Tube Mill

Mechanically Installed by EICHLEAY



Eichleay mechanically installed the new Seamless Tube Mill at the Gary Works of the National Tube Company.

Our background of long experience plus complete modern equipment enables us to undertake the precision installation of all types of machinery and the relocation of industrial units.

Other Services—Complete Plant Erection—Structural Steel Erection—Foundations for Buildings and Equipment—Shoring—Rigging, Underpinning—Moving of Buildings and Machinery.

Write for illustrated booklet.

EC

EICHLEAY CORPORATION

33 S. 19th Street, Pittsburgh 3, Pa.

681 Market Street, San Francisco 5, Calif.

Wilputte Completes Battery of Ovens at Clairton

Wilputte Coke Oven Division of Allied Chemical & Dye Corporation has just completed a battery of 61 coke ovens for the Carnegie-Illinois Steel Corporation at Clairton, Pennsylvania.

These ovens will produce 300,000 tons of coke annually; the entire output to be used for steel making. This is the second large battery of coke ovens that Wilputte has completed at Clairton this year.

* * *

Steel Companies' Tax Bill Nearly $490,000,000

The total tax bill of 48 of the larger iron and steel companies in 1949 amounted to nearly $490,000,000 according to American Iron and Steel Institute. That total, which includes Federal, state and local government assessments but does not include social security and unemployment taxes, was about 172 per cent higher than in 1940.

The amount paid in taxes was equivalent to about 6.6 cents of each dollar of revenue in 1949. It was equal to about $645 for each employee, as compared with about $250 for each employee in 1940. It was equivalent to over 19 cents for each dollar paid in wages and salaries.

The companies' total 1949 tax bill exceeded their combined payments of dividends to shareholders by $267,500,000 whereas in 1940 this difference amounted to only $42,000,000.

The Federal income taxes amounted to about $377,000,000 last year, equal to nearly $500 for each employee.

* * *

Forty Papers to be Presented at Meeting of Iron and Steel Engineers in Cleveland, September 26-29

(Continued from Page 1062)

Whiteley, Lubrication Engineer, American Steel and Wire Co.

"Graphite as a Lubricant," by E. S. Glanch, Mechanical Engineer, Joseph Dixon Crucible Co.

"Extreme Pressure Lubricants," by James H. Lewis, Lubrication Engineer, Carnegie-Illinois Steel Corp.

"Laboratory Screening of All-Purpose Type Greases for Plant Performance Testing," by E. M. Kipp, Chief Lubricants Division, Aluminum Research Laboratories, Aluminum Company of America.

2:00 p.m.—Operating Practice Session—Ball Room

Chairmen: G. C. Brainard, Jr., Assistant Superintendent Cold Strip Mill, Youngstown Sheet and Tube Co.; P. E. Haglund, Superintendent, Raw Materials and Semi-Finished, Ford Motor Co.

"Analyzing Open Heart Data—Statistics vs. Opinion," by Wade R. Weaver, Director, Steel Corservation and Quality Control, Republic Steel Corp.

"Centerless Turning of Bars, Billets and Tubes," by Walter Siegerist, President, The Medart Co.

"Television in Industry," by J. A. Good, Manager Electronics Department, Diamond Power Specialty Corp.

The
STEEL PLANT BRICK MASON

Harbison-Walker to Build Plant

Harbison-Walker Refractories Company, Pittsburgh, Pa., has announced the purchase of approximately 45 acres of land located at Windham, Portage County, Ohio, for the erection of a refractories plant to produce silica refractories.

The plant is designed for a starting capacity of approximately 20,000,000 nine inch brick equivalents annually. All features of design and equipment incorporate the latest developments in the manufacture of silica refractories, and the plant will be strictly modern in every respect. The site is ideally located with respect to both rail and highway facilities.

It is contemplated that the first unit will be in operation within one year.

Secretary of Walsh Refractories Corporation Dies

Albert M. Menzi, secretary of the Walsh Refractories Corp., St. Louis, died July 29. A member of the American Bar Association he also served as attorney for the company and was for many years secretary of the Missouri Group of the American Refractories Institute.

Refractories Company Elects Vice President

G. W. Warnick was elected vice president in charge of operations of the North American Refractories Co., at a meeting of the board of directors held on August 1.

Refractory Brochure

A four page brochure has just been prepared by E. J. Lavino and Company, 1528 Walnut Street, Philadelphia 2, Pa., which explains the composition, properties and applications of Kromepatch Chrome Bonding Cement. A copy of the brochure will be sent upon request to the company, when inquirer gives his business connection.

National Carbon Plans $5,000,000 Electrode Expansion

Pending formal approval of arrangement with TVA for supply of power, National Carbon Division of Union Carbide and Carbon Corporation is considering a major expansion of its electrode plant at Columbia, Tennessee. Company representatives stated that this expansion, to involve an expenditure of over $5,000,000, is being undertaken to meet growing demand for large graphite electrodes used in the steel and metallurgical industries. It would add about $350,000 to the annual payroll of the Columbia Plant.

Location of this expansion program in the south would be another step in the development of major industries in this section of the country.

This plant will have the most modern and efficient production facilities, resulting from National Carbon's extensive research and development activities. It is being especially designed to produce large graphite electrodes to meet present and future service demands of high-power furnace operations. Sizes will range up to and including 40" diameter by 110" long, weighing 7,000 pounds each. It is expected this plant could begin producing graphite electrodes during the spring of 1951.

Jessop Steel Reorganization Plan Approved

Jessop Steel Company, Washington, Pa., manufacturer of specialty steels, was granted final approval of its reorganization plan by the presiding judge of the Washington County, Pa., Courts at a hearing held Monday, July 31st. A majority in number and 75 percent in amount of each class of the company's creditors and shareholders had formally approved the plan prior to the court decision.

Under the reorganization plan, Jessop Steel Company can now secure the $1,000,000 loan from R.F.C., which had been authorized some months ago, subject to consummation of the plan. In addition, the company will acquire the substantial facilities which it now leases from the War Assets Administration.

As a result of the plan, the company has been placed in a sounded financial position and will have sufficient working capital to finance its expanding operations.

Turbo Blowers to be Installed at Ohio Works

Production of blast furnace iron at Carnegie-Illinois' Ohio Works will be increased by nearly 800 tons a day with the installation of two new turboblowers, which will replace present obsolete equipment. As a part of the recently announced U. S. Steel improvement plan, work has already begun to increase the capacity of the Ohio Works 15 open hearth furnaces which are supplied with the iron from the blast furnaces.

Vulcan Mold & Iron to Build $1 Million Plant in Chicago District

A new plant for the manufacture of all types of ingot molds and accessories will be erected in the Chicago, Ill., district at a cost of approximately $1,000,000 by the Vulcan Mold and Iron Co. of Latrobe, Pa.

The new unit will be designed to produce approximately 50,000 tons a year, representing an increase of over 50 per cent beyond Vulcan's present capacity.

To be located at Lansing, Ill., within 23 miles of the Loop and three miles of the Indiana State line, the plant will be competitively situated for Chicago, western and southwestern markets.

It will be the first mold plant built in the Chicago area in the past quarter century. Construction will begin early in September, with April 1, 1951, set as the completion date. Mississippi Valley Structural Steel Co., Melrose Park, Ill., are contractors.

The Open Hearth

(Continued from page 1082)

Allen has been appointed general manager of the company's iron ore operations on both the Marquette and Mesaba Ranges under Sterling's direction.

Succeeding Mr. Sterling as manager of the Mesaba Range properties of the company is Grover J. Holt, formerly chief engineer who was employed by Cliffs in 1942, and his first position with the company was that of Mining and Metallurgical Engineer. He was subsequently appointed Chief Engineer, which is his present position. Holt's broad experience in the iron ore mining industry makes him well qualified for the new position of Manager of Mesaba Range properties.

° ° °

A. Paul Selby became assistant to vice president, sales, United States Steel Corporation of Delaware, effective August 1. He started his business career in 1907 in the general offices of the Illinois Steel Company. Mr. Selby was appointed assistant to vice president in charge of sales, Carnegie-Illinois Steel Corporation, a U. S. Steel subsidiary, on October 16, 1938; assistant to general manager of sales on April 1, 1939, and on October 1, 1945, assistant general manager of sales, the position he now holds.

° ° °

Charles C. Leader has been named as staff assistant to E. E. Johnson, manager of engineering of the General Electric Company's large apparatus divisions.

° ° °

John R. Casey has been appointed manager of the newly established gas turbine sales division of the General Electric apparatus department's turbine divisions, with headquarters in Schenectady. Mr. Casey has been a turbine specialist in the company's Philadelphia office.

° ° °

A. W. Sawyer has been appointed assistant to the vice president of The Lincoln Electric Company of Cleveland, Ohio. In his present position Mr. Sawyer will handle government bids and contracts and also conduct Lincoln's educational activities.

° ° °

Ernest H. Peabody, president and founder of Peabody Engineering Corporation of New York, announced the appointment of William Godley as manager of contract sales, George E. Smith as manager of the air heater division, and Edward R. Clark as manager of the automatic oil burner division.

° ° °

William J. McKee, formerly sales manager, central area, has been appointed general manager of sales of National Tube Company, and Louis W. Mason, formerly assistant to general manager of sales, has succeeded Mr. McKee as sales manager, central area.

° ° °

R. J. Matteson has been appointed district manager of Askania Regulator Company's New York office, effective June 1, 1950. He succeeds W. F. Pray who died April 16, 1950. Mr. Matteson was associated with Superheater Company before joining Askania. Prior to his appointment, Mr. Matteson served as sales and service engineer in the Youngstown district.

Publications -

(Continued from page 1088)

Seals and how to install them. Drawings illustrate how the lip and heel construction of these non-metallic oil seals can be varied. The text gives other pertinent information of importance to designers, engineers, and maintenance men. The booklet is divided into sections on the principle of Clipper Seals, their construction, advantages in various applications, installation data, and other information of interest to oil seal users.

Free copies of this publication are now available from Johns-Manville, 22 East 40 Street, New York 16, New York.

* * *

METERS—A new flow meter bulletin, released by the Republic Flow Meters Co. fully illustrates and explains flow measurement problems and their solution. Meter bodies, differential devices and reading instruments are fully described and a special section is included on wide range and reverse flow. The numerous illustrations in the book relate an informative pictorial story on fluid flow measurement. Write for the Republic Data Book No. 702.

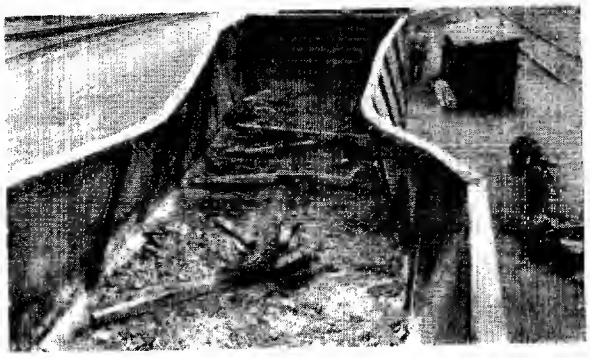
* * *

CONTROL OF CORROSION—"Calgon Controls Corrosion" is a new folder offered by Calgon, Inc., Pittsburgh, Pennsylvania, describing and illustrating the "threshold treatment" whereby minute quantities of Calgon protect industrial, commercial and municipal water systems against general corrosive attack, eliminate "red water" and control corrosion of hot water systems and industrial cooling systems where water temperatures accelerate attack.

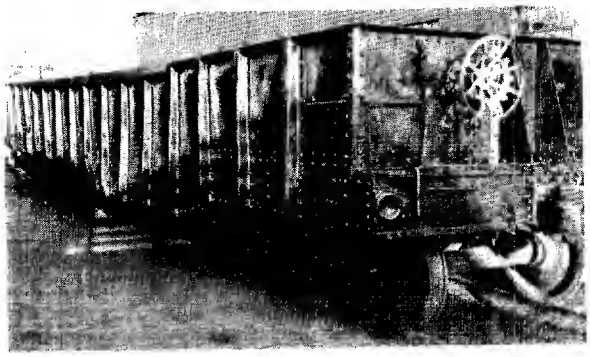
Calgon, because it is strongly adsorbed on most metals and metallic oxides, controls corrosion by forming a sub-microscopic protective film over metal surfaces of the water system, the folder explains. This insulates the surface from the oxygen and other corrosive factors in the water. The film does not build upon itself, nor in any way impede the flow of water. To obtain this film, Calgon is continuously fed to the water stream. Effective concentrations of Calgon, under normal conditions of water flow, range from as little as 1 to 2 ppm. of water in cold-water systems, up to 5 to 10 ppm. in hot-water systems.

Railroad Cars Reconditioned at a Saving of $250 Per Car

Railroad gondola cars used for hauling scrap and hot slabs in steel mills suffer considerable damage from hard usage. Car sides are badly bent by cranes, shovel dippers, and the heavy scrap dropped in the cars. The usual repair method has been to remove rivets, and to straighten bent plates under a press. This requires approximately four to five days per car.



This gondola car, used for hauling scrap and hot slabs in a steel mill has been badly damaged by cranes, shovel dippers, and heavy scrap dropped into the car.



It takes only two days to recondition gondola cars, like this one, when bent sections are heated and straightened Costs are cut $250.

One steel mill has adopted a procedure which accomplishes the same results in half the time and at a considerable saving in cost. They use an Oxweld W-26 blowpipe, equipped with a special multi-flame heating head to heat the bent portion of the car. These bent sections are forced back into shape by means of a jack arrangement.

By using this oxy-acetylene heating method, this steel company reconditions and puts a car back into first-class condition in only two days. Dollar savings amount to approximately $250 per car.

The W-26 blowpipe is a large-capacity blowpipe, which in addition to its use for heavy-duty hand-welding, has many heating applications such as straightening, wrinkle-bending, flame-priming, and descaling.

CLASSIFIED

WANTED

Dominion Foundries & Steel, Ltd., Hamilton, Ontario, are building a new blast furnace and coke oven plant and have good position open for operating superintendent. Technically trained applicants will receive preference but anyone applying must be fully experienced. Apply to F. A. Loosley, Vice-President.

WANTED

ENGINEERS
FOR
STEEL PLANT
PROJECTS

These Engineers must be experienced on board work in general steel plant layout and design, including one or more of the following: Complete Open-Hearth Furnace Plant, Blast Furnace Plant, Bessemer, Rolling Mills, Wire Mills, Sheet and Tin-Plate, etc.; also Engineers experienced in writing specifications for complete Steel Plant Departments, Equipment and Auxiliaries.

Write for application form or give full information on your past experience, salary desired, age, education and when available. Location of this work will be at our Cleveland office

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BUYERS GUIDE

Accumulators—Hydraulic
Hydropress, Inc.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Engineering Co., The
United Eng. & Fdry. Co.

Acetylene—Dissolved
Air Reduction Sales Co.
Linde Air Products Co., The

Acetylene Generating Apparatus
Air Reduction Sales Co., The
Linde Air Products Co.

Acid—Alkali-Proof Construction
Chemastecl Construction Co., Inc.

Acid-Proof Brick
General Refractories Co.
Laclede-Christy Co.

Acid-Proof Cement
Laclede-Christy Co.

Acid-Proof Tank Linings
Harbison-Walker Refractories Co.

Acid-Proof Parts
Falcon Bronze Co.
National Bearing Div., American Brake Shoe Co.

Acid Tanks
Treadwell Construction Co.

Activated Alumina
Aluminum Co. of America

Adaptors—Oxy-Acetylene
Linde Air Products Co., The

Adsorbents
Aluminum Co. of America

Air Compressors
Allis-Chalmers Mfg. Co.
Fuller Co.
Mesta Machine Co.

Air Dump Cars—Automatic Railroad
Magor Car Corporation

Air Conditioning
Surface Combustion Corp.

Alloys
Aluminum Co. of America
Eagle-Picher Sales Co., The
Electro Metallurgical Div., Union Carbide and Carbon Corp.
Ohio Ferro Alloys Corp.
Titanium Alloy Mfg. Co.
United States Graphite Co., The
Vanadium Corp. of America

Alumina
Aluminum Co. of America

Aluminum Fluoride
Aluminum Co. of America

Aluminum—Pure; All Alloys, Shots and Notch Bar
Aluminum Co. of America

Aluminum—Silicon
Vanadium Corp. of America

Aluminum—Titanium
Vanadium Corp. of America

Aluminum—Vanadium
Vanadium Corp. of America

Aluminum—Zirconium
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Ammonium Metavanadate
Electro Metallurgical Div., Union Carbide and Carbon Corp.
Vanadium Corp. of America

Ammonium Paratungstate
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Ammonium Sulphate Driers
Koppers Co., Engineering and Construction Div.

Ammonium Sulphate Recovery Plants
Wilputte Coke Oven Corp.

"Anchorless" Blast Furnace Copper Bosh Plates (Patented)
Falcon Bronze Co.

Annealing Bottoms and Bases
Continental Fdry. & Machine Co.

Annealing Boxes
Contineutal Fdry. & Machine Co.
Loftus Eng. Corp.
Mesta Machine Co.
Surface Combustion Corp.
Union Steel Castings Div. of Blaw-Knox Co.
United Engr. & Fdry. Co.

Annealing Covers
Amsler-Morton
Continental Fdry. & Machine Co.
Loftus Eng. Co.

Arc Furnace—Control Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.

Argon
Air Reduction Sales Co.
Linde Air Products Co., Tho

Asbestos Textiles
Gatke Corp.

Auto Floor Charging Machines
Brosius Co., Edgar E.

Automatic Dump Buckets
Brosius Co., Edgar E.

Automatic Single Hoist Grab Buckets
Brosius Co., Edgar E.

Babbitt Metal
Eagle-Picher Sales Co., The
National Bearing Div., American Brake Shoe Co.
Ryerson & Son, Inc., Joseph T.

Barium-Silicon
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Basic Refractories
Basic Refractories Co.
General Refractories Co.
Harbison-Dalker Refractories Co.

Bearings—Bronze
Falcon Bronze Co.
Link-Belt Co.
National Bearing Div., American Brake Shoe Co.

Bearings and Hangers—Shafting
Gatke Corp.
General Electric Co.
Hyatt Bearings Div., General Motors Corp.
Link-Belt Co.
Medart Co., The
Timken Roller Bearing Co., The

Bearings—Non-Metallic
American Brakeblok Div., American Brake Shoe Co.
Gatke Corp.
Ryerson & Son, Inc., Jos. T.

Bearings—Oilless
American Brakeblok Div., American Brake Shoe Co.
Ryerson & Son, Inc., Jos. T.

Bearings—Oiless Bronze
United States Graphite Co., The

Bearings—Roll Neck
American Brakeblok Div., American Brake Shoe Co.
Falcon Bronze Co.
Gatke Corp.
General Electric Co.
Hyatt Bearings Div., General Motors Corp.
Morgan Construction Co.
National Bearing Div., American Brake Shoe Co.
Ryerson & Son, Inc., Joseph T.
Timken Roller Bearing Co., The

Bearings—Roller Radial
Hyatt Bearings Div., General Motors Corp.
Timken Roller Bearing Co., The

Bearings—Roller, Radial Thrust
Gatke Corp.
Link-Belt Co.

Bearings—Roller Tapered
Hyatt Bearings Div., General Motors Corp.
Link-Belt Co.
Timken Roller Bearing Co., The

Bearings—Roller Thrust
Hyatt Bearings Div., General Motors Corp.
Link-Belt Co.
Timken Roller Bearing Co., The

Bearings—Rolling Mill Equipment
American Brakeblok Div., American Brake Shoe Co.
Falcon Bronze Co.
Gatke Corp.
General Electric Co.
Hyatt Bearings Div., General Motors Corp.
Link-Belt Co.
Morgan Construction Co.
National Bearing Div., American Brake Shoe Co.
Ryerson & Son, Inc., Jos. T.
Timken Roller Bearing Co., The

Bearings—Water-Lubricated
American Brakeblok Div., American Brake Shoe Co.
Gatke Corp.
General Electric Co.
Ryerson & Son, Inc., Jos. T.

Belts and Sheaves—V-Type
Jones Fdry. & Machine Co., W. A.
Medart Co., The

Benzol Recovery Plants
Koppers Co., Engineering and Construction Div.
Wilputte Coke Oven Div., Allied Chemical & Dye Corp.

Bessemer Converters
Pennsylvania Eng. Corp.

Bessemer Converter Linings
Cleveland Quarries Co., The
Harbison-Walker Refractories Co.
United States Graphite Co., The

Bessemer Tuyeres
Harbison-Walker Refractories Co.

Bins—Bulk Material Storage
Butler Bin Co.

Bin Gates
Continental Equipment Co.
Freyn Engineering Co.
Fuller Co.
Link-Belt Co.

Blades and Saws — Abrasive and Diamond For Masonry
Clipper Mfg. Co., The

Blast Furnaces
Freyn Engineering Co.
McKee & Co., Arthur G.
Pollock Co., The Wm. B.

Blast Furnace Bosh Plates
Falcon Bronze Co.
Kinney Engineers, Inc., S. P.
National Bearing Div., American Brake Shoe Co.
Smeeth-Harwood Co.

Blast Furnace Charging Control
Freyn Engineering Co.

Blast Furnace Cinder Notches
National Bearing Div., American Brake Shoe Co.
Smeeth-Harwood Co.

Blast Furnace Clay Guns—Steam, Hydro-Electric, Electric
Brosius Co., Edgar E.

Blast Furnace Construction; Linings
Affiliated Furnace & Engineering, Inc.

Blast Furnace Mantle Plates
Falcon Bronze Co.
Kinney Engineers, Inc., S. P.
National Bearing Div., American Brake Shoe Co.
Smeeth-Harwood Co.

Blast Furnace Tapping Machines
Brosius Co., Edgar E.

Blast Furnace Tuyeres
Falcon Bronze Co.
Kinney Engineers, Inc., S. P.
National Bearing Div., American Brake Shoe Co.
Smeeth-Harwood Co.

Blast Furnace Tuyere Coolers
Kinney Engineers, Inc., S. P.
National Bearing Div., American Brake Shoe Co.
Smeeth-Harwood Co.

Blast Furnace Valves
Kinney Engineers, Inc., S. P.

Blast Gates
Continental Fdry. & Machine Co.

Blowers
Allis-Chalmers Mfg. Co.
Ingersoll-Rand
Robbins & Myers Inc., Propellair Div.
Robinson Ventilating Co.
Roots-Connersville Blower Corp.
Truflo Fan Co.

Blowers—Centrifugal
Allis-Chalmers Mfg. Co.
Roots-Connersville Blower Corp.

Blowers—Rotary Positive Displacement
Roots-Connersville Blower Corp.

Blowers—Turbine
Robinson Ventilating Co.
Surface Combustion Corp.

Blowing Engines
Mesta Machine Co.

Blow Torches—Acetylene
Air Reduction Sales Co.
Linde Air Products Co., The

Boilers
Babcock & Wilcox Co., The

Boiler Coating, Interior
Dampney Co. of America, The

Boiler and Power Plant
Babcock & Wilcox Co., The
Freyn Engineering Co.
Koppers Co., Engineering and Construction Div.
Rust Engineering Co.
Rust Furnace Co.

Boiler, Stoker, Arch and Wall Tie
Babcock & Wilcox Co., The
Harbison-Walker Refractories Co

Boiler Wall Coating
Babcock & Wilcox Co., The
Eagle-Picher Sales Co., The
Johns-Manville
Laclede-Christy Co.

Boosters—Gas
Roots-Connersville Blower Corp.

Boron Alloys
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Boron Carbide
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Bradford Breakers
Heyl & Patterson, Inc.

Brake Linings
Gatke Corp.

Brakes—Electric, Magnetic, Crane
General Electric Co.

Brick—Acid Proof
General Refractories Co.
Harbison-Walker Refractories Co.
Laclede-Christy Co.

Brick—Blast Furnace
General Refractories Co.
Green Fire Brick Co., A. P.
Harbison-Walker Refractories Co.

Brick—Boiler Settings
Babcock & Wilcox Co., The
Carborundum Co., The
General Refractories Co.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
Rust Engineering Co.
Taylor Sons Co., Chas.

Brick—Carbon, Graphite and "Karbate" for tank linings
National Carbon Co., Inc.
Union Carbide and Carbon Corp.

Brick—Checker
Babcock & Wilcox Co., The
General Refractories Co.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
Taylor Sons Co., Chas.

Brick—Clay Runner
General Refractories Co.
Harbison-Walker Refractories Co.
McLain Fire Brick Co., The

Brick—Fire
Babcock & Wilcox Co., The
General Refractories Co.
Globe Brick Co., The
Green Fire Brick Co., A. P.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
McFeely Brick Co.
McLain Fire Brick Co., The
North American Refractories Co
Taylor Sons Co., Chas.

Brick—Heat Insulating
Babcock & Wilcox Co., The
Carborundum Co., The
General Refractories Co.
Harbison Walker Refractories Co.
Johns-Manville
Kellogg Co., M. W.
Laclede-Christy Co.

BUYERS GUIDE

Brick Graphite
United States Graphite Co., The

Brick—Insulating, Refractory
Johns-Manville Sales Corp.
Laclede-Christy Co.

Brick—Ladle
Babcock & Wilcox Co., The
Crescent Brick Co.
Freeport Brick Co.
Globe Brick Co., The
Harbison-Walker Refractories Co
McLain Fire Brick Co., The
Laclede-Christy Co.

Brick, Porcelain
McDanel Refractory Porcelain Co.

Brick—Silica
General Refractories Co.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
McFeely Brick Co.

Brick—Sillimenite (Mullite)
Carborundum Co., The
General Refractories Co.
Laclede-Christy Co.
Taylor Sons Co., Chas.

Bridges—Ore
Heyl & Patterson, Inc.
Wellman Engineering Co., The

Briquets, Chromium; Ferro Manganese; Silicomanganese; Silicon
Electro Metallurgical Div., Union Carbide and Carbon Corp.
Vanadium Corp. of America

Briquettes Graphite
United States Graphite Co., The

Bronze Castings—Anti-Acid
Falcon Bronze Co.
National Bearing Div., American Brake Shoe Co.

Brushes—Carbon, Graphite and Metal-Graphite
National Carbon Co., Inc.
Union Carbide and Carbon Corp.
United States Graphite Co., The

Buckets—Clamshell, Drag Line, Grab, Etc.
Blaw-Knox Co.
Brosius Co., Edgar E.
Wellman Engr. Co., The

Bucksteys—O. H.
National Roll & Foundry Co., The

Bulkheads—O. H.
National Roll & Foundry Co., The

Burner Coolers
Blaw-Knox Co.

Burners
Surface Combustion Corp.

Burners—Blast Furnace Stove
Freyn Engineering Co.
Kinney Engineers, Inc., S. P.

Burners—Boiler
Babcock & Wilcox Co., The
Freyn Engineering Co.
Kinney Engineers, Inc., S. P.
National Airoil Burner Co.

Burners—Gas
Bloom Engineering Co.
Freyn Engineering Co.
National Airoil Burner Co.

Burners—Oil
Babcock & Wilcox Co., The
Bloom Engineering Co.
National Airoil Burner Co.

Burners—Preheated Air
Bloom Engineering Co.

Burners—Pulverized Coal
Babcock & Wilcox Co., The

Bushings—Bronze
Falcon Bronze Co.
Koppers Co., Metal Products Div.
National Bearing Div. American Brake Shoe Co.

Butterfly Valves—Motor Operated
Freyn Engineering Co.
Koppers Co., Engineering and Construction Div.

By-Product Coke Oven Plants
Koppers Co., Engineering and Construction Div.
Wilputte Coke Oven Corp.

Cable—Insulated
General Electric Co.

Cable—Insulated, For Magnets
Ohio Electric Mfg. Co., The

Calcined Alumina
Aluminum Co. of America

Calcium Carbide
Air Reduction Sales Co.
Linde Air Products Co., The

Calcium-Silicon
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Calcium-Manganese-Silicon
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Capacitors
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Calcium Tungstate
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Calcium Tungstate Nuggets
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Carbon Burning Equipment—Acetylene
Linde Air Products Co., The

Carbureted Water Gas and Blue Gas Plants
Koppers Co., Engineering and Construction Div.

Carburizer
Carb-Rite Company
United States Graphite Co., The

Car Dumpers
Heyl & Patterson, Inc.

Car Haul
Heyl & Patterson, Inc.
Pittsburgh Coal Washer Co., The

Cars—Air Dump
Magor Car Corporation

Cars—Autometic Railroad Air Dump
Magor Car Corporation

Cars—Charging and Ingot Mold
Continental Fdry. & Machine Co.
International Clay Machinery Co.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Engineering Co., The
Pennsylvania Eng. Corp.
Pollock Co., The Wm. B.
Treadwell Construction Co.
Youngstown Fdry. & Machine Co., The

Cars—Cinder
Pollock Co., The Wm. B.
Treadwell Co., M. H.

Cars—Electrically Operated
Atlas Car & Mfg. Co., The

Cars—Hot Metal Transfer
Koppers Co, Bartlett Hayward Div.
Pollock Co., The Wm. B.
Treadwell Co., M. H.

Cars—Industrial
Magor Car Corporation
Pollock Co., The Wm. B.
Treadwell Co., M. H.

Cars—Ingots, Charging and Annealing
Atlas Car & Mfg. Co., The
Continental Fdry. & Machine Co.
International Cley Machinery Co.
Pollock Co., The Wm. B.
Youngstown Fdry. & Machine Co., The

Cartridge Fuses—Renewable and Non-Renewable
General Electric Co.

Cast Steel Pinions, Housings, Gears, and Miscellaneous Castings
Union Steel Castings Div. of Blaw-Knox Co.

Castings
Birdsboro Steel Fdry. & Mach. Co.
Continental Fdry. & Machine Co.
Falcon Bronze Co.
Koppers Co., Bartlett Hayward Div.
Lewis Foundry & Machine Div of Blaw-Knox Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
National Bearing Div., American Brake Shoe Co.
National Roll & Foundry Co., The
Ohio Steel Foundry Co., The
Youngstown Fdry. & Machine Co., The

Castings—Air Furnace Iron
Mesta Machine Co.
Youngstown Fdry. & Machine Co., The

Castings—Brass
Falcon Bronze Co.
Morgan Engineering Co., The
National Bearings Div. American Brake Shoe Co.

Castings—Bronze
Falcon Bronze Co.
National Bearing Div., American Brake Shoe Co.

Castings—Copper, Blast Furnace
Falcon Bronze Co.
Mesta Machine Co.
National Bearing Div., American Brake Shoe Co.
Smeeth-Harwood Co.

Castings—Ductile Iron
Youngstown Foundry & Machine Co., The

Castings—Gear
Continental Fdry. & Machine Co.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
United Engr. & Fdry. Co.

Castings—Grey Iron and Steel
Continental Fdry. & Machine Co.
Koppers Co., Bartlett Hayward Div.
Link-Belt Co.
Mackintosh-Hemphill Co.
Medart Co., The
Mesta Machine Co.
National Roll & Foundry Co., The
United Engineering & Foundry Co.
Youngstown Fdry. & Machine Co., The

Castings—Heat and Corrosion Resisting
Continental Fdry. & Machine Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
Ohio Steel Foundry Co., The

Castings—Pipe and Special
Koppers Co., Bartlett Heyward Div.

Castings—Steel
Birdsboro Steel Fdry. & Mach. Co.
Continental Fdry. & Machine Co.
Ohio Steel Foundry Co., The

Caustic Soda
Pittsburgh Plate Glass Co., Columbia Chemical Div.

Cement—Acid Proof
Laclede-Christy Co.

Cement — Furnace — High Temperatura
Babcock & Wilcox Co., The
Eagle-Picher Sales Co., The
Carborundum Co., The
General Refractories Co.
Green Fire Brick Co., A. P.
Harbison-Walker Refractories Co.
Johns-Manville
Kellogg Co., M. W.
Laclede-Christy Co.
North American Refractories Co.
Taylor Sons Co., Chas.

Cement—Insulating
Eagle-Picher Sales Co., The
Laclede-Christy Co.

Cement—High Temperature (Plastic or Powdered)
Eagle-Picher Sales Co., The
Laclede-Christy Co.

Cement—Silica
General Refractories Co.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
Taylor Sons Co., Chas.

Chains and Slings
Taylor Chain Co., S. G.

Charging Boxes
Birdsboro Steel Fdry. & Mach. Co.
Blaw-Knox Co.
Continental Fdry. & Machine Co.
Mesta Machine Co.
Morgan Engineering Co., The
Pollock Co., The Wm. B.
Treadwell Construction Co.
Union Steel Castings Div. of Blaw-Knox Co.

Charging Carbon—Carbon For Open Hearth Charges
Carb-Rite Company
United States Graphite Co., The

Charging Machines—Furnaces
Aetna-Standard Eng. Co., The
Brosius Co., Edgar E.
Morgan Engineering Co., The
Wellman Engineering Co., The

Checker—Hot Blast Stoves
Green Fire Brick Co., A. P.
Harbison-Walker Refractories Co.
Laclede-Christy Co.

Chimneys
Rust Furnace Co.

Chromium
Electro Metallurgical Div., Union Carbide and Carbon Corp.
Vanadium Corp. of America

Cinder Disposal—Power House
Magor Car Corporation

Cleaning Compounds—Metal
Pittsburgh Plate Glass Co., Columbia Chemical Div.

Clutch Facings—Asbestos
Gatke Corp.

Coal Handling Equipment
Amsler-Morton Co., The
Heyl & Patterson, Inc.
Koppers Co., Engineering and Construction Div.
Link-Belt Co.
Pittsburgh Coal Washer Co., The

Coal (Crushed) Handling Equipment, Pneumatic
Fuller Co.

Coal — (Crushed), Seperation Magnets
Ohio Electric Mfg., Co., The

Coatings—Protective For Metal
Dampney Co. of America, The

Coke Ovens and Equipment
Atlas Car & Mfg. Co., The
Koppers Co., Engineering and Construction Div.
Wilputte Coke Oven Div., Allied Chemicel & Dye Corp.

Coke Screening Plants
Heyl & Patterson, Inc.
Koppers Co., Engineering and Conetruction Div.
Wilputte Coke Oven Div., Allied Chemicel & Dye Corp.

Columbium Alloys
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Combustion Controls
Hagan Corp.
Morgan Construction Co.

Commutators
General Electric Co.
Westinghouse Electric Corp.

Compressors—Gas
Allis-Chalmers Mfg. Co.
Fuller Co.
Mesta Machine Co.
Roots-Connersville Blower Corp.

Condensers—Barometric, Surface, Jet
Allis-Chalmers Mfg. Co.
Mesta Machine Co.

Consulting Engineers
Rust Engineering Co.
Rust Furnace Co.
Seaver, Engineers, Jay J.

Contractors
Allis-Chalmers Mfg. Co.
General Electric Co.

Continuous Rolling Mills
Birdsboro Steel Fdry. & Mech. Co
Continental Fdry. & Mach. Co.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mesta Machine Co.
Morgan Construction Co.
Morgen Engineering Co., The
United Engr. & Fdry. Co.

Controllers—Autometic for Cranes
Bailey Meter Co.
General Electric Co.

Controllers—Draft
Bailey Mater Co.
Hagan Corp.

Controllers—Electric, For Megnets
Ohio Electric Mfg., Co., The

Controllers—Electric for Steel Mill Machinery
Allis-Chalmers Mfg. Co.
General Electric Co.

Controllers—Flow and Volume
Bailey Meter Co.
Hagan Corp.
Minneapolis-Honeywell Regulator Co., (Industrial Div.)

Controllers — Manual, Autometic Machine Tool, Crane, Coal and Ore Bridges
General Electric Co.

BUYERS GUIDE

Morgan Engineering Co., The

Controllers—Manual, For Magnets
Ohio Electric Mfg. Co., The

Controls—Combustion Automatic
Bailoy Meter Co.
Hagan Corp.

Controls—Draft
Bailey Meter Co.

Controls—Engine Speed
Hagan Corp.

Controls—Flows and Volume
Hagan Corp.

Controls—Moisture in Dry Blast
Surface Combustion Corp.

Controls—Pressure
Bailey Meter Co.
Hagan Corp.
Minneapolis-Honeywell Regulator Co., (Induetrial Div.)

Controls—Ratio
Hagan Corp.

Conveying Systems
Link-Belt Co.

Conveying Systems—Magnets For
Ohio Electric Mfg., Co., The

Conveying Systems—Pneumatic for Pulverized, Fine, Crushed and Granular Materials
Amsler-Mortoo
Fuller Co.

Cooling Beds
Aetna-Standard Eng. Co., The
Birdsboro Steel Fdry. & Mach. Co.
Continental Fdry. & Machine Co.
Hydropress, Inc.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Construction Co.
Morgan Engineering Co., The
Treadwell Eng. Co.
Youngstown Fdry. & Machine Co., The

Cooling Tables
Aetna-Standard Eng. Co., The
Birdsboro Steel Fdry. & Mach. Co.
Continental Fdry. & Machine Co.
Hydropress, Inc.
Lewis Foundry & Machine Div. of Blaw-Koox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Engineering Co., The
National Roll & Foundry Co., The
Treadwell Engineering Co.
Youngstown Fdry. & Machine Co., The

Copper Welding Bells for Butt Weld Plpe (Patented)
Falcoo Bronze Co.

Coupling Boxes
Birdsboro Steel Fdry. & Mach. Co.
Continental Fdry. & Machine Co.
Lewis Foundry & Machino Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
National Roll & Foundry Co., The
Union Steel Castings Div. of Blaw-Knox Co.

Couplings—Flexible
Farrell-Birmingham Co., Inc.
Jones Fdry. & Machine Co., W. A.
Koppers Co., Bartlett Hayward Div.
Link-Belt Co.
Medart Co., The
Mesta Machine Co.
Poole Fdry. & Mach. Co.

Couplings—Flexible Shaft
Poole Fdry. & Mach. Co.

Couplings—Self-aligning
Koppers Co., Bartlett Hayward Div.

Couplings—Universal
Continental Fdry. & Machine Co.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mesta Machine Co.

Crane Brasses
Falcon Bronze Co.
National Bearing Div., American Brake Shoe Co.

Cranes
Morgan Engineering Co., The

Crane Gears
Tool Steel Gear & Pinion Co.

Crane Wheels
Tool Steel Gear & Pinion Co.

Cranes—Electric Traveling
Morgan Engineering Co., The

Cranes—Lifting Magnets For
Ohio Electric Mfg., Co., The

Crank Shafts
Mesta Machine Co.

Cromonite Rolls
Continental Fdry. & Machine Co.

Crushers
Allis-Chalmers Mfg. Co.
Birdsboro Steel Fdry. & Mach. Co.
Continental Fdry. & Mach. Co.

Crushers—Separation Magnets For
Ohio Electric Mfg., Co., The

Cupola Block—Fire Clay
Babcock & Wilcox Co., The
General Refractories Co.
Green Fire Brick Co., A. P.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
Taylor Sons Co., Chas.

Cupola Linings
Babcock & Wilcox Co., The
General Refractories Co.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
United States Graphite Co., The

Cutouts
General Electric Co.

Cutting Apparatus—Oxy-Acetylene
Air Reduction Sales Co.
Linde Air Products Co., The

Cylinder Packing
Koppers Co., American Hammered Piston Ring Div.

Damper Regulators
Bailey Meter Co.

Decarbonizing Equepment
Linde Air Products Co., The

Desiccants
Aluminum Co. of America

Deoxidizers
Vanadium Corp. of America

Deoxidizers—Electro Silvery
Keokuk Electro-Metals Co.

Design Engineers
Seaver, Engineers, Jay J.

Desulphurizers
Pittsburgh Platc Glass Co., Columbia Chemical Div.

Dolomite—Flux and Refractories
Basic Refractories, Inc.

Dolomite—Refractory
Baker Co., Thc J. E.

Dolomite Throwing Machine
Blaw-Knox Co.

Door—Arches
Blaw-Knox Co.

Doors—Automatic Self-Sealing for Coke Ovens
Koppers Co., Engineering and Construction Div.
Wilputte Coke Oven Div., Allied Chemical & Dye Corp.

Doors—Open Hearth
Blaw-Knox Co.
National Roll & Foundry Co., The

Drives—Chain
Link-Belt Co.

Drives—Gear, Rope
Farrell-Birmingham Co., Ioc.
Mackintosh-Hemphill Co.
Mesta Machine Co.

Drives—Mill
Actna-Staodard Eng. Co., The
Contineotal Fdry. & Machine Co.
Farrell-Birmingham Co., Inc.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Construction Co.
Morgan Engioeering Co., The
National Roll & Foundry Co., The
Wean Eng. Co., Inc., The
Youngstown Fdry. & Machino Co., The

Dry Blast
Blaw-Knox Div. of Blaw-Knox Co.
Surface Combustion Corp.

Dryers—Rotary
Liok-Belt Co.
Treadwell Constructioo Co.

Ductile Iron Castings
Youngstown Foundry & Machine Co., The

Dust Collecting Systems
Koppers Co., Inc., Metal Products Div.
Research Corp.

Dynamometers—Gas Engine Testing
General Electric Co.

Dump Cars—Automatic Railroad Air
Magor Car Corporation

Dynamos
General Electric Co.

Electric Furnace Ladles
Treadwell Construction Co.

Electric Locomotives
Atlas Car & Mfg. Co., The
General Electric Co.

Electric Melting Furnace Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.

Electric Ovens
General Electric Co.

Electric Precipitators
Freyn Engineering Co.
Koppers Co., Inc., Metal Products Div.
Research Corp.

Electrical Installations
Allegheny Industrial Electrical Co.
Rust Furnace Co.

Electrode Holders
National Bearing Div., American Brake Shoe Co.

Electrodes—Graphite
International Graphite & Elcctrode Corp.

Elevators—Bucket Type
Butler Bin Co.

Engineers and Contractors
Aetna-Standard Eng. Co., The
Affiliated Furnacc & Engineering, Inc.
American Ore Reclamation Co.
Amsler-Morton
Anderson Construction Corp., A. E.
Atlas Car & Mfg. Co., The
Bloom Engineering Co.
Boynton & Co., A. J.
Brassert & Co., H. A.
Buell Engineering Co.
Freyn Engineering Co.
Heyl & Patterson, Inc.
Hydropress, Inc.
Kinney Engineers, Inc., S. P.
Koppers Co., Engineering and Construction Div.
McKee & Co., Arthur G.
Morgan Engineering Co., The
Pennsylvania Eng. Corp.
Pittsburgh Coal Washer Co., The
Pollock Co., The Wm. B.
Rust Engineering Co.
Rust Furnace Co.
Seaver, Engineers, Jay J.
Swindell-Dressler Corp.
Treadwell Engineering Co.
Treadwell Co., M. H.
Wean Engineering Co., Inc., The
Wellman Engr. Co., The
Wilputte Coke Oven Corp.
Youngstown Fdry. & Machine Co., The

Engines
Mackintosh-Hemphill Co.
Mesta Machine Co.

Engines—Corliss
Mesta Machioe Co.

Engines—Gas
Mesta Machine Co.
United Engr. & Fdry. Co.

Engines—Hoisting
Link-Belt Co.
Mesta Machine Co.

Engines—Steam, Unaflow
Mesta Machine Co.

Exhausters—Gas
Roots-Connersville Blower Corp.

Fans—Crane Cab
Robbins & Myers Inc., Propellair Div.
Truflo Fan Co.

Fans—Forced and Induced Draft, Exhaust and Waste Heat
Robbins & Myers Inc., Propellair Div.
Robinsoo Veotilatiog Co.

Fans—Mancooler
International Clay Machinery Co.
Robbins & Myors Inc., Propellair Div.
Robinson Ventilating Co.
Truflo Fan Co.

Fans—Portable
Robbins & Myers Inc., Propellair Div.
Robinson Ventilating Co.
Truflo Fan Co.

Fans—Roof Ventilating
Robbins & Myers Inc., Propellair Div.
Truflo Fan Co.

Fans—Sintering
American Ore Reclamation Co.

Fans—Wall
Rohbins & Myers Inc., Propellair Div.
Robinson Ventilating Co.
Truflo Fan Co.

Fast's Couplings
Koppers Co., Bartlett Hayward Div.

Feeders
American Ore Reclamation Co.

Ferro Alloys
Electro Metallurgical Co.
Ohio Ferro-Alloys Corp.
Titanium Alloy Mfg. Div., National Lead Co.
Vanadium Corp. of America

Ferroboron
Electro Metallurgical Div., Uoioo Carbide and Carbon Corp.

Ferro-Chromium
Electro Metallurgical Div., Union Carbide and Carbon Corp.
Ohio Ferro Alloys Corp.
Vanadium Corp. of America

Ferrocolumbium
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Ferro-Manganese
Electro Metallurgical Div., Union Carbide and Carbon Corp.
Ohio Ferro Alloys Corp.

Ferro-Manganese - Silicon Mix
Elcctro Metallurgical Div., Unior Carbide and Carbon Corp.

Ferro-Silicon
Electro Metallurgical Div., Union Carbido and Carbon Corp.
Ohio Ferro-Alloys Corp.
Vanadium Corp. of America

Ferro-Titanium
Electro Metallurgical Div., Union Carbide and Carbon Corp.
Titanium Alloy Mfg. Div., National Lead Co.
Vanadium Corp. of America

Ferrotungsten
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Ferro-Vanadium
Electro Metallurgical Div., Union Carbide and Carbon Corp.
Vanadium Corp. of America

Filters
Bowser, Inc.

Filters—Liquid
Bowser, Inc.

Fire Brick—Firhrik Plastic
Laclede-Christy Co.
Harbison-Walker Refractories Co.

Fire Brick—High Heat
Harbison-Walker Refractories Co.
Laclede-Christy Co.

Fire Brick—Pavers, Non Spalling
Kronton Fire Brick Co., The

Fire Clay
Babcock & Wilcox Co., The
Geoeral Refractories Co.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
Taylor Sons Co., Chas.

Floodlight—Acetylene
Air Reductioo Sales Co.
Linde Air Products Co., The

Floodlighting Equipment
General Electric Co.

Floor Trucks
Atlas Car & Mfg. Co., The

Flue Dust Conditioners
Brosius Co., Inc., Edgar E.

Flue Dust Disposal
Magor Car Corporation

Fluxes—Welding
Linde Air Products Co., The

Fly Ash Collectors
Koppers Co., Inc., Metal Products Div.
Research Corp.

Fly Wheels—Slow and High Speed
Continental Fdry. & Machine Co.
Mackintosh-Hemphill Co.
Mesta Machioe Co.

BUYERS GUIDE

Forgings — Marine, including Line, Thrust, Propeller, and Crank Shafts
Mesta Machine Co.
Forgings—Plain Carbon or Alloy Steel
Heppenstall Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Fuel Oil Treatment
Dacar Chemical Co.
Furnace Builders
Affiliated Furnace & Engineering, Inc.
Amsler-Morton
Rust Furnace Co.
Salem Engineering Co.
Surface Combustion Corp.
Swindell-Dressler Corp.
Wean Engineering Co., Inc., The
Furnace Burners
Amsler-Morton
Continental Fdry. & Machine Co.
Loftus Eng. Corp.
National Airoil Burner Co.
Furnace Engineers
Amsler-Morton
Open Hearth Combustion Co.
Rust Furnace Co.
Salem Engineering Co.
Surface Combustion Corp.
Swindell-Dressler Corp.
Wean Engineering Co., Inc., The
Wellman Engineering Co., The
Furnace Equipment
Amsler-Morton
Blaw-Knox Co.
General Electric Co.
Open Hearth Combustion Co
Rust Furnace Co.
Surface Combustion Corp.
Wean Engineering Co., Inc.,
Furnaces — Annealing and Case Hardening
Amsler-Morton
General Electric Co.
Rust Furnace Co.
Salem Engineering Co.
Surface Combustion Corp.
Swindell-Dressler Corp.
Wean Engineering Co., Inc., The
Furnaces—Continuous
Amsler-Morton
Rust Furnace Co.
Salem Engineering Co.
Surface Combustion Corp.
Swindell Dressler Corp.
Wean Engineering Co., Inc., Tha
Wellman Engineering Co., The
Furnaces—Electric
General Electric Co.
Swindell-Dressler Corp.
Furnaces—Forging, Heat Treating
Amsler-Morton
General Electric Co.
Rust Furnace Co.
Salem Engineering Co.
Surface Combustion Corp.
Wean Engineering Co., Inc., Tha
Wellman Engineering Co., The
Furnace—Ignition
American Ore Reclamation Co.
Furnaces—Melting
Allis-Chalmers Mfg. Co.
Amsler-Morton
Swindell-Dressler Corp.
Wellman Engineering Co., The
Furnaces—Metallurgical
Amsler-Morton
Rust Furnace Co.
Surface Combustion Corp.
Swindell-Dressler Corp.
Wean Engineering Co., Inc., The
Wellman Engineering Co., The
Furnaces—Normalizing
Amsler-Morton
Furnace Engineers, Inc.
General Electric Co.
Rust Furnace Co.
Surface Combustion Corp.
Swindell-Dressler Corp.
Wean Engineering Co., Inc., The
Wellman Engineering Co., The
Furnaces—Open Hearth
Rust Engineering Co.
Furnaces—Pack and Pair
Amsler-Morton
Surface Combustion Corp.
Wean Engineering Co., Inc., Tha
Furnaces—Reheating
Amsler-Morton
Rust Furnace Co.
Salem Engineering Co.
Surface Combustion Corp.
Wean Engineering Co., Inc., The
Wellman Engineering Co., The
Furnaces—Sheet and Tin Mill
Amsler-Morton
Salem Engineering Co.
Surface Combustion Corp.
Swindell-Dressler Corp.
Waan Engineering Co., Inc., The
Furnaces—Stress Relieving
Rust Furnace Co.
Swindell-Dressler Corp.
Gages—Acetylene, Oxygen
Linde Air Products Co., The
Galvanizing Furnaces
Amsler-Morton
Rust Furnace Co.
Surface Combustion Corp.
Wean Eng. Co., Inc., Tha
Galvanizing Kettles
Pollock Co., The Wm. B.
United Engr. & Fdry. Co.
Wean Engineering Co., Inc., The
Gas—Automobile and Tractor Lighting
Linde Air Products Co., The
Gas Burners
Surface Combustion Corp.
Gas Cleaners
Blaw-Knox Co.
Freyn Engineering Co.
Koppers Co., Inc., Metal Products Div.
Gas Exhausters and Generators
Roots-Connersville Blower Corp.
Gas Holders
Koppers Co., Bartlett Hayward Div.
Gas Producers
Amsler-Morton
Koppers Co., Engineering and Construction Div.
Mesta Machine Co.
Wellman Engineering Co., The
Gas Purifiers
Koppers Co., Engineering and Construction Div.
Gas Scrubbers
Freyn Engineering Co.
Kinney Engineers, Inc., S. P.
Koppers Co., Engineering and Construction Div.
Research Corp.
Wilputte Coke Oven Corp.
Gas Valves
Freyn Engineering Co.
Koppers Co., Bartlett Hayward Div.
Wellman Engineering Co., The
Gas—Welding and Cutting
Air Reduction Sales Co.
Linde Air Products Co., The
Gases—Argon, Helium, Neon
Linde Air Products Co., The
Gate Valves—All Iron
Koppers Co., Bartlett Hayward Div.
Gear Drives—Herringbone
Continental Fdry. & Machine Co.
Farrell-Birmingham Co., Inc.
Jones Fdry. & Machine Co., W. A.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Link-Belt Co.
Mesta Machine Co.
Morgan Construction Co.
Gear-Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Gear Wheels
Continental Fdry. & Machine Co.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Medart Co., The
Mesta Machine Co.
Gears
Continental Fdry. & Machine Co.
De Laval Steam Turbine Co.
Falcon Bronze Co.
Farrell-Birmingham Co., Inc.
General Electric Co.
Jones Fdry. & Machine Co., W. A.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Medart Co., The
Mesta Machine Co.
Morgan Construction Co.
Toni Steel Gear & Pinion Co.
United Engineering & Foundry Co.
Gears—Bevel
Link-Belt Co.
Medart Co., The
Gears and Gear Cutters
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
United Engr. & Fdry. Co.
Gears—Herringbone
Continental Fdry. & Machine Co.
Farrell-Birmingham Co., Inc.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Gears—Laminated Phenolic
Gatke Corp.
General Electric Co.
Medart Co., The
Gears—Machine
Medart Co., The
Gears—Pattern, Molded
Medart Co., The
Gears—Speed Reducing
Farrell-Birmingham Co., Inc.
Jones Fdry. & Machine Co., W. A.
Gears and Sprockets
Medart Co., The
Gears—Worm
Continental Fdry. & Machine Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
United Engineering & Foundry Co.
Generators—D.C. and A.C.
Air Reduction Sales Co.
Allis-Chalmers Mfg. Co.
General Electric Co.
Generators—Inert Gas
Roots-Connersville Blower Corp.
Gloves—Welding
General Electric Co.
Linde Air Products Co., The
Goggles—Welding
Linde Air Products Co., The
Graphites
Dixon Crucible Co., Joseph
Graphite—For Open Hearth Charges
International Graphite & Electrode Corp.
National Carbon Co., Inc.
United States Graphite Co., The
Graphite Pipe Joint Compound
United States Graphite Co., The
Graphitizer, Grey Iron
Electro Metallurgical Div., Union Carbide and Carbon Corp.
United States Graphite Co., The
Vanadium Corp. of America
Grinders—Roll
Farrell-Birmingham Co., Inc.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mesta Machine Co.
Hammers—Board, Steam and Steam Drop
Morgan Engineering Co., The
United Engr. & Fdry. Co.
Heat Exchangers
Amsler-Morton
National Carbon Co., Inc.
Union Carbide and Carbon Corp.
Heat Treating Furnace—Electric
General Electric Co.
Helium
Air Reduction Sales Co.
Linde Air Products Co., The
High Electrical Conductivity Copper Castings
Falcon Bronze Co.
Hoists—Ladle Tilting
Pittsburgh Coal Washer Co., The
Hoists—Skip, Bell
Freyn Engineering Co.
Wellman Engineering Co., The
Hose Connections—Oxy-Acetylene
Linde Air Products Co., The
Hot Blast Valves
Blaw-Knox Co.
Brosius Co., Inc., Edgar E.
Falcon Bronze Co.
Freyn Engineering Co.
Hot Blast Valves and Seats for Hot Blast Stoves
Falcon Bronze Co.
Freyn Engineering Co.
Smeeth-Harwood Co.
Hot Metal Car Linings
Cleveland Quarries Co., The
General Refractories Co.
Green Fire Brick Co., A. P.
Laclede-Christy Co.
Hot Tops—City
Ferro Engineering Co., The
General Refractories Co.
Harbison-Walker Refractories Co.
McLain Fire Brick Co.
Hot Topping Compound
National Carbon Co., Inc.
United States Graphite Co., The
Housing Screw Nuts
Falcon Bronze Co.
National Bearing Div., American Brake Shoe Co.
Hydraulic Bushings
Falcon Bronze Co.
Hydraulic Machinery
Birdsboro Steel Fdry. & Mach. Co.
Continental Fdry. & Machine Co.
Hydropress, Inc.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Engineering Co., The
United Engr. & Fdry. Co.
Youngstown Fdry. & Machine Co., The
Hydraulic Operating Valves
Hydropress, Inc.
Koppers Co., Bartlett Hayward Div.
Hydraulic Valves
Hydropress, Inc.
Koppers Co., Bartlett Hayward Div.
Immersion Coils
National Carbon Co., Inc.
Union Carbide and Carbon Corp.
Industrial Tractor—Scoop Type
Butler Bin Co.
Ingots—Magnets For Lifting
Ohio Electric Mfg., Co., The
Ingot Molds, and Accessories—Manufacturers and Designers of
Valley Mould & Iron Corp.
Ingot Mold Cars
Treadwell Construction Co.
Youngstown Fdry. & Machine Co., The
Ingot Mold Stools—Manufacturers and Designers of
Valley Mould & Iron Corp.
Ingot Mold Wash—Mex.
United States Graphite Co., The
Instruments—Efficiency
Bailey Meter Co.
Minneapolis-Honeywell Regulator Co., Brown Instruments Div.
General Electric Co.
Leeds & Northrup Co.
Leitz, Inc., E.
Instruments—Indicating and Recording
Bailey Meter Co.
General Electric Co.
Leeds & Northrup Co.
Minneapolis-Honeywell Regulator Co., Brown Instruments Div.
Insulating Cement
Eagle-Picher Sales Co., The
Harbison-Walker Refractories Co.
Johns-Manville Sales Corp.
Laclede-Christy Co.
Insulating Concrete
Harbison-Walker Refractories Co.
Johns-Manville Sales Corp.
Kellogg Co., M. W.
Insulating Materials for Hot Tops
Eagle-Picher Sales Co., The
Harbison-Walker Refractories Co.
United States Graphite Co., The
Insulating Materials - Varnish, Sheeting, Tape Compound
General Electric Co.
Insulating—Heat
Carborundum Co., The
Eagle-Picher Sales Co., The
General Refractories Co.
Harbison-Walker Refractories Co.
Johns-Manville
Kellogg Co., M. W.
Inwall of Mantle Cooling Plates for Blast Furnaces
Falcon Bronze Co.
Smeeth-Harwood Co.
Iron Ore
Vale do Rio Doce S.A., Cia.
Itabira Iron Ore
Vale do Rio Doce S.A., Cia.
Ladles
Pennsylvania Eng. Works
Pollock Co., The Wm. B.
Treadwell Construction Co.
Wilputte Coke Oven Corp.
Ladle Cranes
Morgan Engineering Co.
Treadwell Eng. Co.
Ladle Recarburizer
Carb-Rite Company
National Carbon Co., Inc.
United States Graphite Co., The
Lathes—Roll
Continental Fdry. & Machine Co.

BUYERS GUIDE

Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mesta Machine Co.
National Roll & Foundry Co., The
Pittsburgh Rolls Div. of Blaw-Knox Co.
United Engr. & Fdry. Co.
Youngstown Fdry. & Machine Co., The

Lead Lined Equipment
Treadwell Construction Co.

Levellers—Roller Type or Hydraulic
Hydropress, Inc.

Lifting Magnets
Ohio Electric Mfg., Co., The

Light Oil Recover and Refining Equipment
Koppers Co., Engineering and Construction Div.
Wilputte Coka Oven Div., Allied Chomical & Dye Corp.

Lime—Chemical and Fluxing
Baker Co., The J. E.

Limestone—Open Hearth and Blast Furnace
Baker Co., The J. E.

Linings—Acid Proof
General Refractories Co.
Harbison-Walker Refractories Co.
Laclede-Christy Co.
National Carbon Co., Inc.

Linings—Open Hearth Ladle
Harbison-Walker Refractories Co.
United States Graphite Co., The

Linings—Open Hearth Runners
Harbison-Walker Refractories Co.
United States Graphite Co., The

Locomotives—Diesel Electric and Gas Electric
Atlas Car & Mfg., Co., The

Locomotives—Electric
Atlas Car & Mfg., Co., The
General Electric Co.

Locomotives—Storage Battery
Atlas Car & Mfg. Co., The
General Electric Co.

Lubricating Systems
Bowser, Inc.

Machine Work
Aetna-Standard Eng. Co., The
Continental Fdry. & Machine Co.
Lewis Foundry & Machine Div. of Blaw-Kno Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Engineering Co., The
Pollock Co., The Wm. B.
Treadwell Engineering Co.
United Engineering & Foundry Co.
Youngstown Fdry. & Machine Co, The

Machinery—Rolling Mill
Aetna-Standard Eng. Co., The
Birdsboro Steel Fdry. & Mach. Co.
Continental Fdry. & Machine Co.
Farrell-Birmingham Co., Inc.
Hydropress, Inc.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Construction Co.
Morgan Engineering Co., The
National Roll & Foundry Co., The
Pittsburgh Rolls Div. of Blaw-Knox Co.
United Engr. & Fdry. Co.
Wean Eng. Co., The
Wellman Engr. Co., The
Youngstown Fdry. & Machine Co., The

Machinery—Sintering
American Ore Reclamation Co.

Machinery—Special
Aetna-Standard Eng. Co., The
Birdsboro Steel Fdry.& Mach. Co.
Continental Fdry. & Machine Co.
Hydropress, Inc.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Medart Co., The
Mesta Machine Co.
Morgan Engineering Co., The
National Roll & Foundry Co., The
Pollock Co., The Wm. B.
Treadwell Engineering Co.
United Engr. & Fdry. Co.
Wean Eng. Co., Inc., The
Wellman Engr. Co., The
Youngstown Fdry. & Machine Co., The
Mackintosh-Hemphill Co.

Machines—Casting
Bailey Co., Wm. M.
Pittsburgh Coal Washer Co., The

Machines—Cutting, Oxy-Acetylene
Air Reduction Sales Co.
Linde Air Products Co., The

Machines—Sintering
American Ore Reclamation Co.

Machines—Welding, Oxy-Acetylene
Air Reduction Sales Co.
Linde Air Products Co., The

Manganese
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Manganese-Boron
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Manganese-Nickel-Titanium
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Magnesia—Refractories
Basic Refractories, Inc.
General Refractories Co.

Magnets—Lifting
Ohio Electric Mfg., Co., The

Magnets—Separation
Ohio Electric Mfg., Co., The

Materials Handling Equipment
Heyl & Patterson, Inc.
Koppers Co., Engineering and Construction Div.

Materials Handling Equipment—Magnets
Ohio Electric Mfg., Co., The

Materials Handling Equipment — Pneumatic for Pulverized, Fine, Crushed and Granular Materials
Fuller Co.

Measuring Instruments
Sheffield Corp., The

Metal Maintenance
Dampney Co. of America, The

Meters—Flow
Bailey Meter Co.
Bowser, Inc.
General Electric Co.
Minneapolis-Honeywell Regulator Co., Industrial Div.

Meters—Gas and Air
Bailey Metar Co.
Leeds & Northrup Co.
Minneapolis-Honeywell Regulator Co., (Industrial Div.)
Roots-Connersville Blower Corp.

Meters—Recording
Bailey Meter Co.
Leeds & Northrup Co.
Minneapolis-Honeywell Regulator Co., Industrial Div.

Mill Guides
Aetna-Standard Eng. Co., The
Continental Fdry. & Machine Co.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
Morgan Construction Co.
Morgan Engineering Co., The
Treadwell Engineering Co.
United Engr. & Fdry. Co.
Youngstown Fdry. & Machine Co., The

Mills—Universal Zinc
Aetna-Standard Eng. Co., The
Continental Fdry. & Machine Co.
Hydropress, Inc.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphill Co.
Mesta Machine Co.
United Engineering & Foundry Co.

Mixers
American Ore Reclamation Co.

Moisture Control for Dry Blast
Surface Combustion Corp.

Mold Pluga
National Carbon Co., Inc.

Mold Preparation
Dacar Chemical Co.

Molybdenum Metal Powder (85%)
Electro Metallurgical Div., Union Carbide and Carbon Corp.

Motors—Electric Steel Mill
Allis-Chalmers Mfg. Co.
General Electric Co.

Motors—Super Synchronous
General Electric Co.

Mud Gun—Electrical
Bailey Co., Wm. M.

Mud Gun—Mechanical
Brosius Co., Edgar E.

Neutralization of Acid Trade Waste
Chemsteel Construction Co., Inc.

Nitrogen
Air Reduction Sales Co.
Linde Air Products Co., The

Oil Fuse Cutouts (Aerial and Underground)
General Electric Co.

Oil Separators
Hagan Corp.

Open Hearth Consultant
Amsler-Morton
Open Hearth Combustion Co.

Open Hearth Design
Amsler-Morton
Freyn Engineering Co.
McKee & Co., Arthur G.
Open Hearth Combustion Co.
Pennsylvania Eng. Corp.
Rust Furnace Co.
Wellman Engineering Co., The

Open Hearth Ladles
Treadwell Construction Co.

Open Hearth Slag Granulators
Brosius Co., Edgar E.

Open Hearth Water Cooled Doors
Bailey Co., Wm. M.

Ore Bridges
Heyl & Patterson, Inc.
Wellman Engineering Co., The

Ore Transfer Cars
Atlas Car & Mfg. Co., The
Wellman Engineering Co., The

Oxy-Acetylene Apparatus
Air Reduction Sales Co.
Linde Air Products Co., The

Oxygen
Air Reduction Sales Co.
Linde Air Products Co., The

Packing—Asbestos
Gatke Corp.
Johns-Manville

Paint—Heat Resisting
Dampney Co. of America, The
Kellogg Co., The M. W.

Paint Burners—Acetylene
Linde Air Products Co., The

Paint—High Heat Resisting
Dampney Co. of America, The

Paints—Graphite
Dixon Crucible Co., Joseph

Paints—Maintenance
Dixon Crucible Co., Joseph

Paving Brick—Non Spalling Fire Clay
Ironton Fire Brick Co., The

Pelletizers
American Ore Reclamation Co.
Sintering Machinery Corp.

Penstocks
Babcock & Wilcox Co., The
National Roll & Foundry Co., The
Pollock Co., The Wm. B.
Treadwell Construction Co.

Peterson Checker—Open Hearth
Open Hearth Combustion Co.

Phenol Recovery Equipment
Koppers Co., Engineering and Construction Div.
Wilputte Coke Oven Div., Allied Chemical & Dye Corp.

Phenol Removal Plants
Koppers Co., Engineering and Construction Div.
Morgan Engineering Co., The
Wilputte Coke Oven Div., Allied Chemical & Dye Corp.

Phosphorized Copper
National Bearing Div., American Brake Shoe Co.

Pickle Liquor Ammonia Sulphate Recovery Plants
Wilputte Coke Oven Div., Allied Chemical & Dye Corp.

Pickling Machines, or Sheet and Tin Plate, Pipe, Wire, Automobile parts, small Castings and Forgings
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mesta Machine Co.
Wean Eng. Co., Inc., The

Pickling Tank Heaters
National Carbon Co., Inc.
Union Carbida and Carbon Corp.
Chemsteel Construction Co., Inc.
Harbison-Walker Refractories Co.
National Carbon Co., Inc.
Union Carbide and Carbon Corp.

Pig Casting Machines
Heyl & Patterson, Inc.
Pittsburgh Coal Washer Co., The
Tool Steel Gear & Pinion Co.

Pigs—Magnets For Lifting
Ohio Electric Mfg., Co., The

Pinions—Mill
Continental Fdry. & Machine Co.
Farrell-Birmingham Co., Inc.
Lewis Foundry & Machine Div. of Blaw-Knox Co.
Mackintosh-Hemphilla Co.
Mesta Machina Co.
National Roll & Foundry Co., The
United Engr. & Fdry. Co.

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The husky load of scrap in the photograph weighs practically the same as the first load lifted eight hours earlier. Why?

Ohio Magnets lift efficiently—*with ease*—over extended periods of operation because they operate *cooler*. Copper coils are heavier-duty, carefully sealed with plenty of non-cracking asphaltic [illegible].

Uniform lifting capacity is one of the reasons why more mills are standardizing on Ohio. Satisfy yourself. Send your next order to Ohio—*25 years a leader in magnetic materials handling.*

This magnet lifts [illegible] all day long.

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Ohio MAGNETS

A-2027

Stretches steel...and dollars, too ...with TIMKEN® bearings

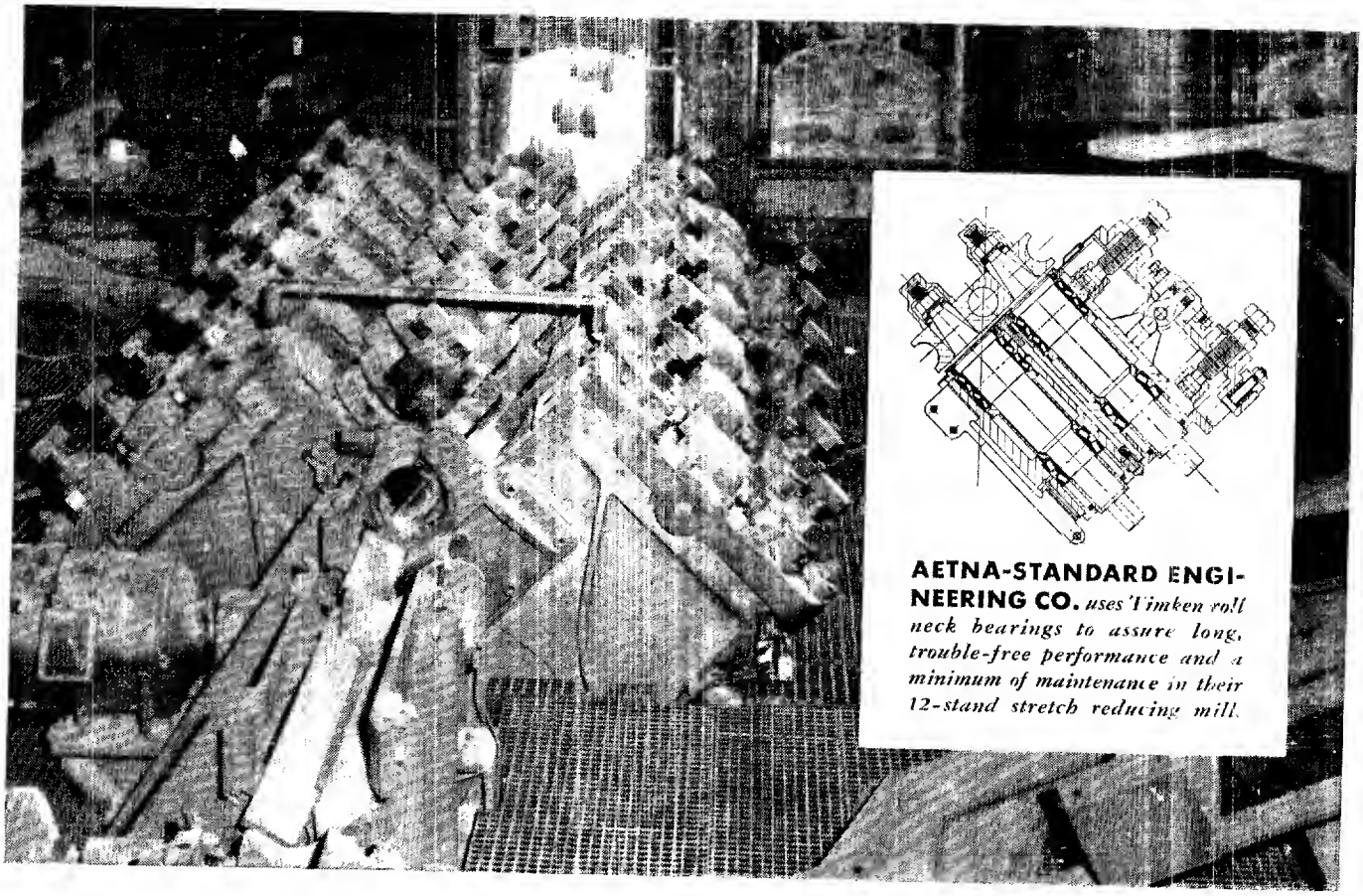
ONE of the 3 mills of its kind in the world, this Aetna-Standard 12-stand, 14" continuous stretch reducing mill uses varying-speed rolls to reduce tube wall thickness and stretch the tube. And to insure against breakdowns and high maintenance costs, Timken® bearings are used on the roll necks and in the drive.

Timken roll neck bearings give longer trouble-free life than other roll neck bearings. Timken balanced proportion design permits larger diameter roll necks than ever before possible with tapered roller bearings, giving greater mill rigidity. Roll neck strength is increased 50 to 60% and load ratings are increased up to 40%.

Because Timken bearings practically eliminate friction, high rolling speeds are possible and roll neck wear is eliminated. Mills can be started smoothly and easily under full loads without disturbing the gauge setting. No steel is lost. Timken bearings permit the use of simple, economical grease lubrication, thereby eliminating the use of complicated lubrication systems in most applications. Roll changes can be made more easily and faster. And since Timken bearings take both radial and thrust loads in any combination, no thrust bearings are needed.

You can get all these advantages now in new or existing equipment with Timken balanced proportion roll neck bearings. For full information, consult our roll neck bearing specialists. Write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

The "A" seal on a product means the bearings are the best



AETNA-STANDARD ENGINEERING CO. *uses Timken roll neck bearings to assure long, trouble-free performance and a minimum of maintenance in their 12-stand stretch reducing mill.*

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CLEVELAND, OHIO
BOOTHS 104, 105, 106, AND 107
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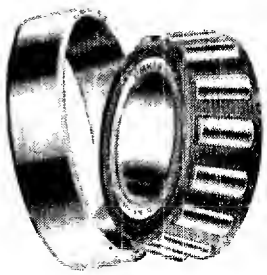

NOT JUST A BALL ... NOT JUST A ROLLER ... THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION